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VOL. III

ECONOMIC AFFAIRS

KERALA GAZETTEERS DEPARTMENT
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PREFACE

The present Volume is the third in the four-volume State Gazetteer Project undertaken by the Gazetteers Department, Government of Kerala. Vol. I and Part I of Vol. II have already been published. The present volume consists of Chapters IV to VIII in the scheme drawn up by the Gazetteer of India Unit for the State Gazetteers, including Agriculture and Irrigation, Industries, Banking, Trade & Commerce, Communications and Economic Trends.

The material presented in this Volume was compiled by 1985-86 and was sent to Press by the end of 1987. Although effort has been made to bring the information presented here up-to-date, some lacunae may still remain. The procedure adopted in this Volume is to present the available information on the economy of Kerala, along with the functioning of the various Government Departments and institutions in a systematic manner. The Volume will serve as a useful reference book for all those involved in the planning and administration of economic activity in Kerala, and those who are interested in various economic activities.

This volume is being brought out when the VIII Plan discussions are under way. In order to plan for the future, it will be useful to have an overview of the performance of the State in various fields, which should be evaluated and proper conclusions drawn. This volume is not intended as a comprehensive evaluative exercise, and we will be happy if this volume inspires concerned administrators and laymen to do more probing and come out with illuminating suggestions on the future course of our economy.

The execution of this Volume was the collective work of the staff of the Gazetteers Department, and no word of praise will be enough for the industry and dedication shown by each

staff member. Particularly, I wish to mention the name of Sri A. Balakrishnan, presently Additional Director, Department of Economics and Statistics who was with us for the past six years. He did the lion's share of compiling, editing and even helped in reading the proofs. It was his single minded dedication and hard work, even to the extent of running small errands, that resulted in the completion of this Volume and was a source of inspiration for the rest of the staff. I wish to thank the Sub-Editor, Sri V. A. Abdul Khader, for his readiness to help at all levels. I wish to thank Shri P. N. Nair, Retired Chief Conservator of Forests for contributing the section on forests in Chapter IV, and the Director, Zoological Survey of India, Calcutta for kindly supplying to us the list of animals in Kerala appended to the Chapter. Sri P. Thomas, Smt. Sulochana Bai, Smt. J. Sarala Devi, Smt. A. Sylaja and Smt. K. Santhamma did the typing and rendered assistance in the work, including preparing the index The cartography section of the Research and Development Department, Centre for Earth Science Studies, prepared the maps. I also wish to thank Sri V. Krishnan Nair, Junior Superintendent for running the Office efficiently, which immensely helped the smooth completion of the work. I also thank Sri G. Antony and Sri V Karunakaran Nair for their capable and willing co-operation and assistance.

I wish to thank the Superintendent, Government Presees, Trivandrum, and the staff for undertaking and executing the printing of this volume so competently.

K. N. GANESH,
State Editor.

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AGRICULTURE AND IRRIGATION

The low belt which borders on the sea and the backwaters has in the course of ages become rich with the works of man, and the landscape, shaded and fanned by the *'the feathery palm'* presents a chequered scheme of light and shade. As we leave the seaboard, an undulating country, diversified with grassy flats, naked hills and wooded terraces, intersected by numerous torrents and rapids and profusely dotted with homesteads, orchards and cultivated fields, rolls upto the foot of the Western Ghats. Here the landscape, nobler and more intensified in grandeur, merges itself in wide forests of continuous shade.

(K. P. Padmanabha Menon's History of Kerala)

Introduction

Tirukural, the ancient Tamil work says:

"Uluvār ulagattārk kāniaḥ dāṟṟā
Teluvārai yellām poṟuttu"

(Kural 1032)

(The tillers are the linchpin of the world and that they really support the rest of the population.) All through the ages cultivation of the soil was considered as a noble occupation.

Agriculture forms the mainstay of the population of the State. The contribution of the State's agricultural sector is 41.85% of the State income. It provides employment to about 11% of the total population of the State viz., 254.54 lakhs (i.e., 41.4% of the labour force).

The abundance of rain and natural fertility of the soil have made Kerala an essentially agricultural region. Diversity of crops and heterogeneity in cultivation are the keynote of agriculture in the State; while the highland is mainly under plantation crops like tea, coffee, rubber and cardamom and lowland is virtually monopolised by paddy and coconuts the midland is under a host of major and minor crops often cultivated intermixed with one another.

Of the total area of 3,885,497 hectares, the net area sown is 2,180,355 hectares. The gross cropped area is 2,861,702 hectares. The State is unique for the widespread system of cultivation and poly-cropping pattern. The State is chronically deficit in foodgrains production having to depend on imports from other States. For most of the commercial crops grown, the markets are outside the State, in some cases even outside the country.—

The table given below gives a classification of the land area of the State according to mode of utilization. A notable feature of the agricultural sector in the State is the high intensity of cropping pattern which can be measured by the ratio of gross cropped area to the net area sown. The intensity of cropping during 1983-84 was 131%.

About 56% of the area is under cultivation, 28% is forest and 7% is used for non-agricultural purposes. The other important utilisations are cultivable waste and barren and uncultivable land.

The cultivable lands may be classified as wet, dry, garden and plantations. Paddy is the principal wet crop grown. On dry lands tapioca forms one of the main crops cultivated. Pulses like horse-gram, green-gram and black-gram are also raised as dryland crops. Vegetables, elephant yam *(chena)*, *Chembu* (colocasia antiquorum), plantain, fruit cultivation, cashew, coconut palm etc., come under garden cultivation. Plantations are confined to the hills or highlands. Tea, rubber,

LAND UTILIZATION 1983-84

	Head of Classification of land		1983-84	
			Actual In Hectares	Per cent
	(1)		(2)	(3)
1.	Total geographical area according to village papers	..	3,885,497	100.00
2.	Forests	..	1,081,509	27.83
3.	Land put to non-agricultural uses	..	277,719	7.15
4.	Barren and uncultivable land	..	86,590	2 23
5.	Permanent pastures and other grazing lands	..	5,222	0.13
6.	Land under miscellaneous crops not included in net area sown	..	54,701	1.41
7.	Cultivable waste	..	128,924	3.32
8.	Fallow and other than current fallow	..	27,539	0.71
9.	Current fallow	..	42,938	1.11
10.	Net area sown	..	2,180,355	56.11
11.	Area sown more than once	..	6,81,347	17.54
12.	Total cropped area	..	2,861,702	73.65

Source: Directorate of Economics and Statistics.

cardamom and coffee are the most important plantation crops. The various items included in this classification and their definitions are given below:

1. *Forests:* All actual forest areas on land classed or administered as forests under any legal enactments dealing with forests whether State owned or private.

2. *Land put to non-agricultural use:* Area occupied by building, roads, courtyards, play grounds, railways, rivers, canals and other lands put to uses other than agriculture.

3. *Barren and uncultivable land:* Land like mountains, deserts, etc., are land which cannot be brought under cultivation unless at a high cost.

4. *Permanent pastures and grazing land:* All grazing land whether they are permanent pastures or not.

5. *Miscellaneous tree crops:* All cultivable land which is not included under thatching grass, bamboo, bushes, etc.

6. *Cultivable waste:* All land available for cultivation but not taken up for cultivation or abandoned after a few years

for one or other reasons. Land once cultivated, but not cultivated, for 5 years in succession is also included in this category.

7. *Current fallows:* These are crop areas which are kept fallow during the current year.

8. *Other fallow lands:* All lands which are taken up for cultivation, but are temporarily out of cultivation for a period of not less than one year and not more than 5 years.

9. *Net area sown:* This represents area sown with crops Counting area sown more than once in the same year only once.

10. Total cropped area is the area obtained by counting twice those area which are sown twice and so on.

In agriculture, an operational holding still continues to be the fundamental unit of decision making and therefore information on the structure and characteristic of the holdings particularly in respect of marginal and small holdings is an essential pre-requisite for drawing out any well thought out plan of development in this sector. According to the Agricultural Census of 1980-81, nearly 89% of the 42 lakh operational holdings were below 1 hectare. These holdings covered only about 42% of the total area of the holdings. The overall average area of a holding was 0.43 hectare in 1980-81, 98.6% of the individual operational holdings covering 98% of the area of the holdings fall under the tenure category of wholly owned and self operated holdings.

THE DISTRIBUTION PATTERN OF THE OPERATIONAL HOLDINGS

(Number and area in Hectares)

Sl. No.	Size Class	*Individual holdings*		*Institutional holdings*		*Total*	
		No.	*Area*	*No.*	*Area*	*No.*	*Area*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	Below 1 HA.	3,705,299	745,013	22,724	5,405	3,728,023	750,418
2.	1.00-2.00	286,944	394,331	2,861	3,923	289,805	398,254
3.	2.00-4.00	121,999	327,095	1,623	4,315	123,622	331,410
4.	4.00-10.00	34,696	188,708	1,131	6,571	35,827	195,279
5.	10.00 & above	3,098	61,532	554	68,428	3,652	129,960
	Total	4,152,036	1,716,679	28,893	88,642	4,180,929	1,805,321

Source: Agricultural Census 1980-81.

Land Reclamation

Reclamation of land for purposes of agriculture constitutes a land-mark in the progress of civilisation. There are references in the Sangam classics to the reclamation of forest lands through the efforts of kings. The *Maduraikkanchi* (286-88) informs that paddy was cultivated on the slopes of hills after they had been cleared of thorns and bushes as well as valuable trees like *Akü* and Sandalwood.

The most conspicuous economic characteristic of land is its comparative fixity in supply and its consequent scarcity. To a certain extent this natural constraint is overcome by land reclamation which signifies extension of area under cultivation with a view to augmenting food production. The concept of land reclamation has widened in recent years to include new objectives. Most of present day reclamation schemes are multi-purpose in character with a wide coverage. In Kerala reclamation schemes are directed towards bringing more lands under rice crop and improve the yield of the existing fields by erecting barriers to the entry of brackish water from the lakes and seas and channelling, the flow of fresh water from the river systems to these fields. Land reclaimed thus is a productive input and the cost of reclamation is a capital investment.

The reclamation of paddy lands from water in Kuttanad was the child of necessity as the region was densely populated and suffered from a chronic deficit in food supply from early times. Records show that from 1009 M.E. (1833) if not from an earlier period, reclamation has been going on. [1]The general consensus of opinion is that the entire area now known as Kuttanad in the erstwhile North Travancore has emerged as a result of reclamation activities by the ryots spread over several centuries. During the eighties of the last century the pressure of an increasing population on the available food supply compelled the State also to pay increasing attention to reclamation projects to extend the area under rice cultivation.

[1] Letter No. 92|C dated, Camp: Quilon, 15th August 1907 from the Dewan of Travancore to British Resident in Travancore.

Activity was mainly directed towards changing the water courses. The proximity of the low lying rice belt to the backwaters and the sea made the intrusion of salinity a source of perennial danger in many areas and considerably diminished the yield from the lands. The reclamation schemes were mostly intended to bring more lands under the rice crop and improve the yield of the existing fields by putting up barriers against the entry of brackish water from the lakes and seas and channelling the flow of fresh water from the river system to these fields. A considerable area was reclaimed in this manner for rice cultivation.

Reclamation of land from water for paddy cultivation was not confined to Kuttanad; it was practised on an extensive scale in the Cochin area of Kerala also. In Cochin there are several fresh water lakes whose beds have come to be known as *'kole lands'*. The most important of these lakes are the Enamakkal and the Mangara lakes in the Trichur Taluk, which are connected by a canal and are fed by the three rivers, Karavanoor, Viyyur and Vadakkancherry. Besides these there are smaller lakes like the Muriyan in Mukundapuram and the Kattampal in Talappally. All these lakes have been reclaimed and brought under the plough. The system of cultivation is called ***kole krishi***.

The low lying lands, known as the 'rice bowls' of the State are spread over three districts viz., Alleppey, Kottayam and Trichur. The portion in Alleppey and Kottayam districts form the Kuttanad area and that in Trichur the kole lands. The low lying lands in Kerala have more or less similar characteristics. The cultivation practices—starting from bunding and dewatering to harvesting and threshing—adopted by the cultivators in those two regions are the same.

The low lying lands in Kerala are 'man-made' in the sense that these lands are product of land reclamation work undertaken in Kayals (Backwaters) and other water logged areas[2]. The land reclamation in Kerala has a long history in its back, though its exact period of origin has yet to be traced out. But kayal reclamation, the main part of land reclamation

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[2] Report of the Kuttanad Enquiry Commission, Government of Kerala, Trivandrum, 1971, p. 34.

work and of recent origin was started since 1833[1]. The pioneering attempt of large scale kayal reclamation was started in Kuttanad region. Lured by the successful reclamation work and profitable paddy cultivation in Kuttanad area, some enterprising farmers (some were farmers in the Kuttanad area) slowly turned their attention to similar water logged areas, comprising a number of *kayals* in Trichur area, which have later come to be known as *kole* lands.

Reclamation in small patches has been attempted by agriculturists of the State on their own accord in several regions. But the heavy financial outlay necessary, the risk involved and the inherent uncertainty of sure success have stood in the way of a large scale or planned reclamation scheme being taken up by the ryots themselves. Hence this has to be taken at the State level. The Kuttanad in Alleppey district, the *kole* lands in Trichur district and Kattampally swamp in Cannanore district are vast areas that are amenable to reclamation, Paravoor Kayal reclamation, Korapuzha reclamation, Vellayani reclamation and the Mattancherry reclamation schemes are some of the smaller schemes sponsored by the State.

Kuttanad Reclamation Scheme

Kuttanad extends over an area of 874 sq. km. This consists of 490 sq. km. of paddy fields, 304 sq. km. of garden lands and 80 sq. km. of lakes and water sources. The Arabian Sea and the M. C. Road respectively form its western and eastern boundaries. In the north it is bounded by the Ettumannoor-Vaikkom Road and in the south by the Haripad-Thiruvalla Road. Four rivers viz., the Meenachil, the Manimala, the Pamba and the Achencoil empty into Kuttanad.

Kuttanad is an area of intensive paddy cultivation. The fields are mostly single crop lands, called *Puncha* fields. The level of most of the *Puncha* fields is about a metre below Mean Sea Level. These are subject to submersion due to monsoon floods. On the close of the monsoon, the paddy fields are grouped into large plots known as *padasekharams*, outer

[3] Pillai, V. R., and Panicker, P. G. K., "Land Reclamation in Kerala" Asia Publishing House, 1965, p. 14.

earthern bunds are put up around them and water pumped out from within and the seeds are broadcast. The chances of the bund getting breached or overtopped due to an unexpected rain are very high which entails heavy losses to the farmer. Intrusion of salinity into the low lands during summer, presence of acidity and toxicity in the soil are the other serious problems facing the agriculturists of Kuttanad. Lack of proper road facilities, scarcity of potable water are also factors that prevent an all-round improvement of this region. Hence detailed investigation has been carried out for drawing up proposals for the comprehensive development of Kuttanad. This includes,—

1. Salt water Barrier at Thanneermukkom.
2. Spillway at Thottappally.
3. Alleppey—Changanacherry Road.
4. Thrikkunnapuzha Lock.

The Salt Water Barrier at Thanneermukkom is intended for prevention of ingress of salinity into Kuttanad during summer while allowing for discharge of flood waters during rainy season. The barrage is being located at the narrowest portion of Vembanad Lake between Thanneermukkom in the west and Vechoor in the east. It will be 1,252 mtr. long with 93 ventways each 12.15 mtr. x 5.47 mtr. The water level in the lake portion will be allowed upto 1.52 mtr. Two link islands are formed in the central portion which are meant for convenience in construction, and these will be later developed into tourist spots. For navigation purposes a twin lock is provided at Thanneermukkom side and a single lock at Vechoor side. The shutters will be opened in july for flood discharge and will be closed by November 15th before the water in the lake become saline. Salt water thus will be completely shut-off, south of Thanneermukkom and this portion of Vembanad will become a fresh water lake.

The Spillway at Thottappally is intended to provide an easier and more direct outlet for the combined flood discharge of the Pamba, Achencoil and Manimala rivers to the Sea which otherwise find their exit through the Cochin outlet, traversing about 77 km. This direct outlet will reduce the intensity and duration of floods in Kuttanad. This is situated at Thottappally in the National Highway, 20 km. south of Alleppey. The work was commissioned by the end of 1954.

This consists of a leading channel about 8 km. long, a spillway channel 1,310 mtr. long and 365 mtr. wide with a bridge cum regulator across the spillway channel. The bridge cum regulator is 365 mtr. long with 40 vents, each having 7.6 mtr. clear span. The spill level of the regulator is at (-) 1.82 mtr. and the maximum flood level + 1.52 mtr. The designed discharge capacity is 1,915 cusecs at + 1.06 m.

When the Thanneermukkom Salt Water Barrier is completed, the ingress of saline water into Kuttanad through the Cochin outlet will be completely prevented. But as this region is open to Kayamkulam lake on the south, salt water can still enter the Kuttanad and pollute the fresh water. To prevent this saline intrusion and at the same time allow for navigation, it is proposed to have a lock at Thrikkunnapuzha in the T. S. canal. Two locks are proposed 6.1 mtr. x 9.14 mtr. and length 45.6 mtr. with a bridge across. The spill level of the regulator is fixed at (-) 2.94 mtr. and the T. S. canal is 76.2 mtr. wide in this reach.

The Alleppey-Changanacherry Road is the first road to pass through the heart of Kuttanad connecting Alleppey with Changanacherry and touching the important villages enroute. The road is 29 km. long. Three major bridges have been constructed at the river crossings where formerly junghar service was available.

Detailed field investigation for the reclamation of Kuttanad, making it suitable for double crop paddy cultivation has been carried out recently. The Project report prepared suggests a regrouping of the Padasekharams and to encircle each field group with permanent submersible bunds. The total length of permanent bunds will come to 1966 kms. and that of retaining walls to 752 kms.

Another handicap in the cultivation of the lands in Kuttanad is the presence of toxicity in the soil. The soils develop a high toxic condition on exposure to sun when the field is dry. One of the reasons attributed to this is that dilute acids are exuded from decaying vegetable matter which lies buried in the soil at depths 15 to 100 cm. When the surface gets dry, capillary action brings up traces of these acids and by

exposure to sun and air, toxic salts are formed on the surface. This prevents the plants from absorbing all the nutrients available in the soil or that are applied through fertilizers. In order to permit continuous cultivation in the area it is necessary to remove the toxic salts by frequent leaching with fresh water. Experiments in this direction have revealed that fresh water let into the fields for a depth of 10 to 20 cm. will be able to wash away the salts. This has to be done at intervals of 10 days till the crop reaches the flowering stage. The total extent of *kari* lands in Kuttanad is 49,000 hectares and the total annual requirement of fresh water for leaching away toxicity as above is computed as 2,040 Mm^3 (72 T. M. C.).

Reclamation of Trichur Kole lands

The Kole lands of Trichur district are analogous to the Kayal lands of Kuttanad. Monsoon floods submerge them whereas during summer, saline intrusion and inadequacy of fresh water for irrigation affect the crops adversely.

A project known as Trichur Kole Project for enabling 3 crop paddy cultivation in place of the existing single crop has been envisaged. At present, in most of the areas, only one crop is cultivated during the summer months. After the north-east monsoon subsides, temporary earthen bunds are put up around individual *Padasekharams* and the water is pumped out into the outer channels. Fresh water is supplied from the Peechi and Chalakudy Projects. Salt water is prevented by permanent barriers and earthen cross bunds. However, these temporary bunds are washed off during the succeeding floods. Hence the proposals mainly include (1) the construction of permanent bunds, (2) deepening and widening of channels for easy flood discharge, (3) diversion of flood waters (from entering the kole lands) through the proposed Kuttamangalam cut.

Other works include construction of regulators and sluices across the canal, construction of suitable roads for transport of manure, seeds, harvested produces, etc.

There are about 11,000 hectares of *kole* lands in this area. The water required for removal of toxicity from the soil is about 460 Mm^3 (16.2 T. M. C.).

When the integrated project is implemented 3 paddy crops can be raised in an area of 11,000 hectares in Trichur district. By adopting improved varieties of seeds and scientific methods of cultivation an additional quantity of about 35,000 tonnes of rice can be raised every year. Other benefits that can be derived from the scheme are: (1) A good percentage of the annual flood damages can be prevented, (2) The bunds around the fields facilitate the planting of coconut trees. (3) Communication facilities will be improved.

Kattampally Reclamation Scheme

The Kattampally project in Cannanore district is designed for reclamation, flood control, salinity control, inland navigation and road communication. This consists of: (1) A regulator of 94 mtr. long across the Kattampally river (Valapattanam basin), (2) Approach roads cum flood banks, (3) Navigation lock and (4) A road way over the regulator.

The scheme is taken up in two stages. In the first stage started in 1957, the following works were completed: (1) the construction of the regulator with the road way, (2) construction of the navigation lock, (3) approach roads and flood banks, (4) pumping installations and (5) other appurtenant works.

The channelisation of the river through the regulator and reclamation of 405 hectares of the Kattampally swamp will be taken up in the second stage. The total area benefited will be 1,295 hectares.

Kayamkulam Kayal Scheme

The Kayamkulam Kayal lies in Alleppey district between the Vembanad Kayal and the Ashtamudi Kayal covering about 18 sq. km. The kayal is shallow, the depth of water varying from 1 to 1.25 mtr. in most of the areas. There are many shallow areas suitable for reclamation on the fringes of the Kayamkulam kayal on the eastern and western sides. The more extensive area lying on the northern side of the kayal in the Arattupuzha village is first taken up for reclamation. The extent of this portion is 320 hectares.

A permanent bund of 4,000 mtr. long was formed in the kayal in 1957. Another parallel bund running north to south is formed on the eastern side close to the main land which

prevents the salt water from flowing into the cultivated area. Two parallel cross bunds connecting the western and eastern bunds have a drainage channel in between and these separate the reclaimed areas known as north and south blocks.

The area proposed for reclamation at Arattupuzha on the eastern side of the Kayal is the one between Vellathukadavu and Pulikeezhar mouth having an extent of 324 hectares. About 430 metres of bund of sufficient height to protect the land during high tide and floods have been suggested.

The only source of fresh water is the Danapady canal where the flow dwindles after the monsoons. Hence double cropping is not possible at present. However after the implementation of the Pamba Irrigation Scheme, two crops can be tried.

From the 320 hectares of reclaimed area in the first stage, one crop can be cultivated yielding 560 tonnes of rice every year. At a later stage after completion of the Pamba Irrigation Scheme two crops can be raised in this area. With the provision of a salt water barrier across the Danapady canal with flood banks, 200 hectares of lands upstream of this canal can be made suitable for 2 crops cultivation.

Paravoor Kayal Reclamation Scheme

The Agriculture Department has constructed two bunds in the Paravoor Kayal (in the estuary of the Ithikara river in Quilon district) for reclaiming a part of the Kayal for paddy cultivation. The bund put for Block I, having a length of 1620 mtr. is to reclaim an area of about 57 hectares and that of Block II measuring 1704 mtr. is for the reclamation of 105 hectares. A quantity of 6.7 Mm^3 (238 M. cft.) will be required for removal of toxicity from this reclaimed area.

Ponnani Kole Lands Reclamation Scheme

This is a scheme similar to the Trichur Kole Project and envisages the construction of permanent bunds around the low lying *padasekharams* known as "Ponnani Kole lands" located in the Talappilly and Ponnani taluks to facilitate pumping out water before each crop. The water required for cultivation for 3 crops is expected to be obtained from the Bharathapuzha river when the regulators proposed across the river and the second stage of Cheerakuzhi scheme are implemented. The scheme will benefit an area of about 2,400 hectares enabling an

additional production of rice of about 7,000 tonnes per annum in an area which is agriculturally backward.

The water required for the removal of toxicity from the soils of this area when reclaimed, works out to about 99 Mm^3 (3.5 T. M. C.). The scheme deserves detailed investigation.

The Korapuzha Reclamation Scheme

This is a new proposal and is intended for the reclamation of about 1,500 hectares of low lying lands in the estuary of the Korapuzha river. It includes (1) the construction of permanent bunds, (2) improvements to the Agalapuzha river, (3) construction of a regulator-cum-salt water barrier across the Korapuzha at Elathur. The approximate cost of the Scheme is Rs. 150 lakhs and can facilitate the cultivation of 3 crops in Karuvannur-Kannankara area and in Payyoli, Purakkad and Naderi villages. The water requirement for removing toxicity works out to about 62 Mm^3 (2.2 T. M. C.).

The extent of lands that could be reclaimed from the water-logged marshes of the State has been roughly assessed as 121,000 hectares. Schemes for reclamation of only a portion of this have been drawn up or implemented. Further schemes for reclaiming the balance area have to be investigated. All such reclaimed lands will require a good quantity of water for the removal of toxicity. The requirement of water for this purpose and the break-up of the reclaimable lands in this State are given in table below:

EXTENT OF RECLAIMABLE MARSHES

Name of Region	*Extent in hectares*	*Water in Mm3*	*Requirement TMC*
Kuttanad	49,000	2,040	72.0
Sherthallai	4,000	170	6.0
Cochin Kanayannur	5,700	210	8.5
Parur	10,000	410	14.5
Trichur district	10,000	410	14.5
Vaikom	10.000	410	14.5
Parts of North Kerala	32,000	1,330	47.0
Total	120,700	5,010	177.0

Irrigation

There is a general presumption that because of her heavy rains, Kerala does not need any irrigation. It is also argued that in view of the peculiar undulating terrain and other natural features irrigation works will be costlier and more uneconomical than elsewhere. It is true that because of the heavy rains, there is some kind of cultivation all over the land. Paddy cultivation is by far the largest agricultural practice pursued by a major section of the people. The low-lying lands are cultivated with paddy and are fit only for paddy cultivation. Depending upon the availability of water, one, two or even three crops can be raised on these lands. Crop failures owing to the irregularity of monsoons have almost become a common feature. Consequently it has become possible only to raise one crop in a major portion of the paddy growing area. Hence necessity for providing storage facilities for supplying water in order to prevent the vagaries of nature and to stabilise and facilitate the adoption of intensive forms of cultivation is keenly felt in Kerala as elsewhere. Endowed with abundant rainfall and watered by forty-four rivers, the State cannot complain of inadequacy of resources of water. Usually such water as is required for the cultivation of crops is derived from the seasonal rainfall precipitating in the region. But the natural rainfall, as regards both quantity and seasonal incidence of a fall, is sometimes inadequate for cultivation. The crop seasons are adjusted so as to be in conformity with the period of rainfall. If the monsoons are normal, and rain properly distributed the yield from the crops will be good and no artificial irrigation will be required. Even then as the total yearly rainfall is not uniformly distributed, there is either too much or too little of water according to plant requirements even in the periods of monsoons. There are, therefore, areas of great scarcity of water in certain localities in the State and these are therefore affected by drought which causes crop failure.

The present sources of irrigation in the State are natural streams, channels, channel-fed and rain-fed tanks, natural water reservoirs formed by constructing embankments across the line of drainage or natural streams, and storage facilities provided by the major, medium and minor irrigation works.*

* From the Sangam works *(Akananuru* 252:13) we learn that it was the responsibility of the local authorities to appoint watchmen who were on duty day and night by turns for the purpose of guarding the tanks and reservoirs and regulating the proper flows of water.

Water during the rainy season is allowed to collect in the natural streams and tanks and taken to the fields through channels. Even now it is this system of irrigation that is prominent throughout the State. During the hey-day of the landed aristocracy, it was common to construct tanks. But with the economic changes and the gradual decline or aristocracy, very few tanks were constructed during the last two or three decades. On the other hand the existing tanks have been allowed to decay. This picture has somewhat, changed now. With the dawn of independence a drive has been made in implementing development schemes in the State and a number of major, medium and minor irrigation works were taken up by Government.

The irrigation works in the State can be broadly divided into two major heads viz., (1) major irrigation works and (2) works under medium irrigation, minor irrigation, salinity exclusion etc.

The irrigation potential of the State is estimated at 16 lakh hectares (net) or 25 lakhs hectares (gross). Till the end of March 1984 an area of 5.44 lakh hectares (gross) i. e., 22% of the potential was brought under irrigation through major, medium and minor irrigation works.

Major and Medium Irrigation

The estimated area that can be irrigated through major and medium irrigation is 6 lakh hectares (net) or 14 lakh hectares (gross). But the total area irrigated through major and medium irrigation till March 1984 was 3.68 lakh hectares (gross). The ten completed projects have a total ayacut area of about 1.47 lakh hectares (gross). In 1983-84 seven projects were partially commissioned and an area of 35,416 hectares (gross) was brought under irrigation. Till 31st March 1984, Rs. 371.41 crores was spent on major and medium irrigation projects. The physical and financial achievement of major and medium irrigation projects are given in Appendix.

There are now eighteen ongoing major and medium irrigation projects in Kerala. The Pamba Irrigation Project, started in 1961, is one among them. Till March 1984 an amount of Rs. 4,324 lakh was spent on this project and an area of 43,138 hectares irrigated. In 1983-84, Rs. 400 lakhs was spent on the project to benefit 4,680 hectares. For the Periyar Valley Irrigation Project started in 1956 an expenditure

of Rs. 4,043 lakhs was incurred till March 1984. The area irrigated by the Project till March 1984 was 73,741 hectares. In 1983-84 an amount of Rs. 270 lakhs was spent on this project, and the area irrigated was 6,297 hectares. Upto March 1984 an amount of Rs. 1,296 lakhs was spent on the Chitturpuzha-Moolathara Project to bring benefit to an area of 25,655 hectares. The expenditure in 1983-84 on this project was Rs. 100 lakhs and the additional area benefited during the year was 540 hectares. Kuttiadi Irrigation Project was started during 1962. The total investment on this project till March 1984 was Rs. 4,407 lakhs, while the area benefited was 34,331 hectares. The amount spent on this Project in 1983-84 was of Rs. 300 lakhs and the additional area brought under irrigation 2,632 hectares. The area irrigated through Kanjirapuzha Irrigation Project in 1983-84 was 5,485 hectares and the amount expended Rs. 350 lakhs.

The Kallada Irrigation Project is a multi purpose project started in 1961. A total amount of over Rs. 102 crores was spent on the Project till March 1984 and an area of 16,590 hectares was brought under irrigation. The expenditure on this project in 1983-1984 was Rs. 3,000 lakhs and the additional area benefited 15,345 hectares. On Pazhassi Irrigation Project a total amount of Rs. 4,480 lakhs was incurred till March 1984. The total area irrigated by the Project was 10,743 hectares. In 1983 84 an amount of Rs. 400 lakhs was spent on this project and the area benefited was only 437 hectares. Chimoni Irrigation Project was started in 1976. The total amount invested on this project till March 1984 was Rs. 806 lakhs. In 1983-84 an amount of Rs. 150 lakhs was spent on this project. The investment on Idamalayar Irrigation Project, another multi purpose project started in 1977, was Rs. 500 lakhs in 1983-84. An amount of Rs. 250 lakhs was spent on the Muvattupuzha Irrigation Project in 1983-84. Till March 1984 an amount of Rs. 141 lakhs was spent on Kakkadavu Irrigation Project. The expenditure incurred on this project in 1983-84 was Rs. 11 lakhs.

There are now five ongoing medium irrigation projects under different stages of completion. The Attappady Irrigation Project started in 1975 is one among them and for this project an expenditure of Rs. 50 lakhs was spent in 1983-84. The Karappuzha Irrigation Project is another medium irrigation project on which an amount of Rs. 50 lakhs was spent in 1983-84. About the other medium projects on which expenditure was

incurred in 1983-84 were the Vamanapuram Project and the Banasurasagar Project.

Minor Irrigation

Minor Irrigation Projects contribute significantly to the availability of water for crop production, especially for rice cultivation. To a large extent they meet the supplementary needs of the winter rice crop and to a lesser extent they provide water to raise an additional crop in summer. Minor irrigation projects have several advantages over big irrigation projects. They are quick yielding and require low capital investment. Benefits from the potential created flow immediately as relatively very little of distribution network is to be built up. They have great employment potential especially of unskilled and semi-skilled labour. Being spread throughout the length and breadth of the State the benefits are very widely distributed. The undulating topography of hills and valleys breaks the continuity of arable land. It would not be possible for big projects therefore to take water to every pocket of arable land. Minor irrigation projects can take care of the needs of even such isolated pockets.

Minor irrigation structures include diversion weirs across streams and rivulets, tanks and reservoirs, canal, lift irrigation works and salinity control structures. For the maximum utilisation of water integrated operation of more than one type of structure would be necessary.

Benefits from minor irrigation projects are largely of supplementary nature in that water made available is used to stabilise a crop by preventing the adverse effects of drought towards the fag-end of the season. With the introduction of high yielding short and medium duration varieties the supplementary needs of water can be reduced. Therefore the emphasis in developing minor irrigation source should be on sources which can help raise additional crops. As far as possible gravity and lift systems should be combined so as to maximise the benefits.

As new projects are commissioned and more areas are provided with irrigation protection, older ones get into disutility due to lack of adequate repairs and maintenance resulting in moving some areas out of protection afforded by such projects. Thus the net area given irrigation protection gets

reduced gradually to that extent*. The present system and arrangement for the maintenance of minor irrigation projects have to be reviewed and appropriate systems will have to be designed. Great emphasis is laid on the 'Ela Programme' or Intensive Paddy Development Units as a means for enhancing rice production and bringing about a break-through in rice yields. Assured availability of water will be a crucial factor in attaining the objectives of the programme. Therefore top-most priority should be given to Intensive Paddy Development (I.P.D.) Units or 'Ela Programme' areas in undertaking minor irrigation schemes. Similarly the spill over projects, Thanneermukkom bund and Kattampally scheme would be given top-most priority so that they can be completed as early as possible.

Minor irrigation schemes are classified into four groups based on the nature and magnitude of investment involved.

Minor Irrigation, Class I

Irrigation works costing Rs. 2 lakhs and above, and upto Rs. 25 lakhs come under this category. In hill areas the upper limit is Rs. 30 lakhs.

Minor Irrigation, Class II

Structures costing Rs. 2 lakhs and below, and benefiting more than 2 hectares come under this category.

Lift Irrigation

Lift Irrigation schemes benefiting more than 40.5 hectares are taken up under the auspices of the Government. Those schemes benefiting less than 40.5 hectares are executed through Irrigation Co-operative Societies who are assisted by giving subsidy and interest-free loans.

In order to support and encourage the initiative of Panchayats in augmenting water availability for cultivation it is proposed to assist them in deepening tanks and installing pumpsets.

*This is reinforced by the State Planning Boards evaluation (1975) of minor irrigation schemes which noted the inordinate delay in execution, negligible addition to area despite large expenditure, inadequate maintenance misplaced emphasis on stablising the second crop other than raising and additional crop.

Panchayats are to contribute only 1|3 of the civil works, while the rest will be borne by the Government.

Land Mortgage Banks are financing minor irrigation projects on priority basis. During 1983-84, 2,225 hectares (net) or 3,338 hectares (gross) had been brought under irrigation through Minor Irrigation Class I and the amount spent was Rs. 224 lakhs. Works other than petty works costing upto Rs. 2 lakhs are classified under this category. The area irrigated through minor irrigation Class II schemes in 1983-84 was 1,137 hectares (gross) and the amount spent was Rs. 81 lakhs. Works involving drawal of water by mechanical means from rivers, tanks etc., are classified under this category. Only works benefiting over 40 to 50 hectares are taken up at Government cost. The works benefiting less than 40 to 50 hectares are executed by the lift irrigation co-operative societies. In respect of works benefiting scheduled castes and scheduled tribes this limit is not insisted upon by Government. In 1983-84 1894 hectares (net) or 2,841 hectares (gross) was irrigated through lift irrigation. The amount spent was Rs. 161.88 lakhs. The area irrigated through IPD Ela works in 1983-84 was about 917 hectares.

Soil Erosion and its control

In tracts that are in general subject to sudden downpour of rain the problem of soil erosion is a serious one as it leads to serious impoverishment of the soil. The prevention of soil erosion is intimately connected with farming practices. Experiments have shown that with every heavy shower of rain there is a loss of the fine surface soil to the extent of 2.5 to 3 tonnes per hectare per year.

This washed off soil was also found to be richer in plant nutrients so that losses by erosion are serious enough to demand the most urgent attention. Besides the loss of much soil, erosion leads to the silting up of tanks reducing their storage, a rise in river beds making them shallow and subject to floods.

The soil is the upper most disintegrated layer of the earth's crust. Its average depth is about 15 to 30 centimetres though sometimes it is known to extend to a depth of 2.5 metres or even more. Soil erosion is the transportation of soil from one place to another through the agency of water or wind in motion.

Under natural conditions, undisturbed by man an equilibrium gets established between the climate of a place, and the cover of vegetation that protects the soil layer. A certain amount of erosion does takes place even under this natural cover but it is a slow and very limited process which is balanced by the new soil that is formed by weathering agencies. Under intensive agriculture, this balance is upset and the removal of soil takes place at a faster rate than its renewal by soil forming processes.

Wind and water are the two agencies that cause soil erosion. Wind erosion is not so wide-spread as water erosion and exists in a serious form only in certain places. Erosion due to water is much more widespread and more serious. Extensive erosion occurs in many parts of the State. The two main types of erosion are sheet erosion and gully erosion. In the former movement of run off water and eroded soil occurs in sheets. When this moving sheet assumes sufficient velocity its cutting action on the soil is increased and this results in a trench or gully being formed at any weak point or depression in the surface. When the velocity of the run off water is doubled its energy is correspondingly increased 64 times. The gullies tend to get deeper and wider with every succeeding rain and eventually cut up the agricultural land into fragments and making it unfit for cultivation. Of the two types, gully erosion is the more evident and spectacular but sheet erosion is really the more dangerous as it is insidious and is seldom noticed before it is too late to remedy its distinctive effects.

The amount of run off depends on the intensity of the rainfall. A heavy storm in a few hours causes as much or more even damage as all the rains during the rest of the year. This is because a gentle rain does not pulverise and break down the "crumb" structure of the soil and the soil is able to absorb the water and accumulate it in the deeper layers—for the use of subsequent crops. Another factor that influences the speed and extent of the run off is the slope of the land.

the greater the slope, the greater the velocity of flow. The slopes of the hills are subject to severe erosion during the rainy season and large quantities of the rich surface soil are lost in the rushing torrents through hill streams and gullies. Further the practices of cultivating tapioca on the steep slopes without any proper anti-erosive measures and of leaving the soil in a very loose condition after the harvest leads to severe erosion.

The main principle underlying the methods of preventing soil erosion is to reduce the velocity of the flowing water. Methods of control may be classified as mechanical and biological. Mechanical methods of control are bunding, listing or scooping, terracing, gullying and its control. The mechanical methods practised in Kerala are contour bunds, bench terraces, contour trenches, check dams, stabilisation of gullies retaining walls, correction of water courses protection of reservoirs etc. Biological methods of control involve cultivation of crops in such a way to ensure the maximum protection cover to the soil, particularly during the rainy season and afforestation. The soil conservation wing of the Department of Agriculture is the authority in charge of the soil conservation programmes in the State.

Soil Conservation

The undulating topography with alternating hills and valleys, high intensity rainfall spread over two monsoon seasons and increasing demand for arable land and consequent denudation of forests have accentuated the problem of soil erosion in the State. Out of the total geographical area of 38.86 lakh hectares in the State, nearly 19 lakh hectares of land are highly vulnerable to soil erosion hazards. Out of this, about 78,000 hectares (4 per cent) of land alone has so far been brought under soil conservation measures through various soil conservation schemes including the schemes taken up by Small Farmers Development Agency. The remaining 18.22 lakhs hectares of land

require urgent soil conservation measures. Land is the most valuable and scarce resource for agricultural development in the State. There is urgent need for a scientific land-use policy with the objective of optimum utilisation of land resources without being detrimental to its long term potentialities. With the objective of conserving land resources the Kerala Land Development Act, 17 of 1964 was enacted and programmes are being implemented utilising the provisions of the Act. Land being scarce, efforts are to be made to reclaim every possible bit of land economically feasible. Therefore land development programmes are undertaken in water logged areas. For assessing the gravity of the soil erosion problem, scientific land-use planning and also to meet a variety of needs including irrigation planning, forestry engineering, urban development etc., survey of the soil and land resources are significant. Keeping these needs in view programmes have been formulated in the area of soil conservation.

(A) Soil Conservation

Soil and Water Conservation in arable lands

The depletion of valuable fertile top soil is taking place fast; but the process being largely invisible, its impact is not realised immediately. Over a period of time the problem assumes unmanageable magnitude; hence there is need for taking urgent protective measures. Areas highly vulnerable are chosen to give protection from soil erosion.

Nearly 10 lakh hectares of arable land is estimated to suffer from the hazards of soil erosion in the State. Water being the main cause of erosion, structures are built to minimise the hazard of water erosion. It is proposed to protect highly vulnerable areas under the provision of the Kerala Land Development Act, 17 of 1964, by providing 25% subsidy and 75% loan recoverable in 20 half yearly instalments within a period of 10 years at 6% interest.

Reclamation of Water-logged areas

In several locations of the State, especially in the coastal region, lands suffer from water logging. Such lands can be

reclaimed and made productive by putting up simple structures such as bunds.

Soil Conservation in the catchment areas of river valley Projects

The catchment areas of several river valley projects are subjected to severe soil erosion. Indiscriminate denudation of forests cover and improper management of land result in fast silting up of the reservoirs. Such continued erosion activity drastically reduces capacity and life of the reservoirs. Urgent steps are necessary to rehabilitate the catchment areas which are highly vulnerable to soil erosion by undertaking appropriate soil conservation measures. Already a few river valley projects have been identified. Soil conservation measures are undertaken in 8500 hectares of land falling in the catchment of such projects at a cost of Rs. 188 lakhs.

River Training Measures

Indiscriminate cultivation and unscientific management of the water sheds of the Bharathapuzha river system has resulted in widening and changing the river course causing enormous damage to lands on either side of the river. The river bed is fast rising by sedimentation reducing the capacity of the river to carry the flow. Protecting the river banks and limiting the course of the river by simple river training programmes is possible. Valuable experience of successful river training programmes are available from other parts of the country. Construction of groynes, adoption of agronomic and agrostologic measures by giving 100 per cent grant so as to train the rivers to control stream bank erosion in the Bharathapuzha basin, and a new programme for propagation of water conservation| harvesting technology in the rainfed, dry land areas in Palghat District by harnessing the rainfall run-off water and storing the same in the Project area for giving one or two supplementary irrigation to crops at critical stages of growth, have been programmed.

Through various land reform measures agricultural land was made available to Harijans, tribals and landless labourers. The land has to be scientifically developed if they are to secure benefit from the land as securing the right of ownership alone would not be enough to better their economic conditions. Undertaking soil conservation measures is a pre-requisite for scientific land-use and development. Economically being the most backward sections of the society, their capacity for making long term investments on land development programmes is limited. It is proposed to undertake soil conservation measures on land belonging to Harijans, tribals and landless agricultural labourers.

Water Potential and Possibilities for future development

As indicated earlier, the area that can be irrigated in Kerala is 16 lakh hectares (net) or 25 lakh hectares (gross), of this, 6 lakh hectares (net) or 14 lakh hectares (gross) area can be irrigated by major and medium irrigation projects. The area that can be irrigated by minor irrigation is estimated at 10 lakh hectares (net) or 11 lakh hectares (gross).* The ten completed irrigation projects irrigate an area of 1.47 lakh hectares and the eleven partially commissioned on-going schemes irrigate an area of 2.19 lakh hectares. Thus the gross area irrigated by the major and medium irrigation schemes in Kerala till March 1984 was 3.66 lakh hectares. In addition of 30.500 hectares of land is expected to be brought under irrigation area as a result of the on-going schemes by the end of 1984-85. During the VII Plan (1985-1990) it is proposed to complete all the major and medium irrigation schemes started prior to 1st April 1974. Utilisation of the Potential already created will be one of the important strategies of the Seventh Plan. It is expected that by the end of 2000 A. D. (i.e., 9th Plan—1996-2000), 24270 hectares net can be irrigated with an investment of Rs. 371 crores.

Ground Water

The development of Ground Water in Kerala was not thought of seriously all these years due to the misconceived notion that the State's entire water requirement would be met by the fairly rich annual rainfall and high density of rivers. Now the situation is changed and different sectors like community water supply, industries, agriculture etc., have increased the demand for water

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* Source: Seventh Five Year Plan, Kerala State Planning Board.

The optimum utilisation of ground water assumes greater importance due to the following reasons. The frequent failures in rainfall as well as the inconsistency of its distribution make the surface water resources inadequate to meet the water requirements. The intensive cropping pattern calls for irrigation throughout the year except during the monsoons. The rugged and undulating topography of Kerala with a slope towards the sea accelerates quick run off of surface water reducing the surface water retention capacity of the land. Besides, extension of surface water irrigation through canal system to many parts of the mid land and eastern highlands is not practicable and economic due to the rugged toposequence. The recent trend to irrigate cash crops, and the requirement of fresh water for water supply systems industrial uses etc., have all increased the demand for fresh water.

The three main agencies directly involved with the exploration and exploitation of ground water are: (1) State Ground Water Department established as a part of the Directorate of Agriculture during 1967 and upgraded into an independent department since 1978. (2) Public Health Engineering Department which constructed about 337 tube wells upto 90 mtrs. depth in coastal tracts of Quilon and Alleppey for rural water supply, and (3) Central Ground Water Board which is engaged in Regional Ground Water Surveys throughout the State.

The methodology to assess the usable and replenishable ground water resources in quantitative terms needs to be evolved in selected hydrogeological and agroclimatic settings requiring long duration basin-wise water balance studies. At present the ground water balance has been worked out taking into consideration the annual rainfall, infiltration factor, the influent flow from streams, the run off and draft. In computing the replenishable ground water resources seepage losses from canals and surface water bodies and recycled water from irrigated area (which contribute the recharge of the ground water body) have not been taken into account. The present degree of utilisation, points out to the scope for large scale exploitation through various structures like open tube, bore and filter point wells. Massive development of Ground Water is indirectly advantageous in water logged areas to help more infiltration, lowering of water table and to bring about better drainage conditions. The quality of ground water depends on the concentration of total dissolved solids, chloride content and even trace elements which are at times detrimental to health and for agricultural and industrial uses. In Kerala ground water is generally potable except in areas surrounded by

3|9603|MC.

backwaters around pollution centres and certain pockets where contamination is high through fertiliser application as in certain parts of Cannanore and Palghat districts.

Future programmes include detailed ground water studies on a micro level water-shed basis. Each water-shed will be sub divided into various individual hydrologic sub basins where systematic studies will be taken to understand various parameter such as re-charge, rate if evapo-transpiration conductivity, and annual drafts.

At present Kerala has an annual replenishable resource of 7500 MCM. Out of this, the present utilisation for all the areas of irrigation domestic water supply and industrial water supply would be approximately 15 per cent. In the beginning of 2000 A. D. the total annual exploitation of ground water would be in the order of 40 per cent of the annual replenishable resource.

As the coastal belt between Karunagappalli and Shertallai had already been proved to be potential and quality of water from this belt is found to be suitable for irrigation exploitation of ground water through public tube wells is feasible. There is also considerable scope to have a number of filter point wells in the extreme coastal sandy pockets in districts of Trivandrum, Quilon Ernakulam, Trichur, Malappuram, Kozhikode and Cannanore. In select hardrock areas especially in areas closer to major lineaments there is scope to exploit deep water bearing horizons through bore wells. The ground water department has taken Kozhinjampara and Malampuzha command areas for finding out scope for development through bore wells. The open dug wells being the mainstay of all ground water developmental programmes, can be had throughout the State. Only the scope may be limited in eastern uplands and areas where shallow water table had already been exploited to a considerable degree.*

The Ground Water Department carried out systematic Hydrogeological Surveys in 7445 hectares of land to identify potential ground water zones, suitable sites for bore wells, tube wells, filter point wells, shallow bore-wells and open irrigation wells. Suitable sites were cleared and appropriate designs were given for 686 open irrigation wells. 18 tube wells, 134 filter-point wells, 300 bore-wells

* *Source:* Report of the High Level Committee on Land and Water Resources pp. 120-123—State Planning Board, Trivandrum, May, 1984.

and 44 shallow bore wells in various parts of the State. The Ground Water Department also dug 286 bore-wells and 18 tube wells for providing drinking water to Harijan/Girijan Colonies. Added to it 134 filter point wells and 44 shallow bore-wells were dug to irrigate 300 hectares of farm lands.

Agriculture including horticulture

Soil

Soil is the basis of all human prosperity, for without soil no vegetation can survive much less any agriculture. As such it is essential in any scheme of agricultural betterment to have a proper understanding of the soil as a means of improving crop production.

The layman's concept of soil as something dead and inert is widespread one, but nonetheless erroneous for that. In the words of the great Swedish Chemist Berzelius "Soil is the chemical laboratory of nature, wherein various chemical decompositions and reactions take place in a hidden manner". From the physical point of view, soil is a medium for plant growth, emphasising the mechanical support it gives to plants. Others refer to it as the site for numerous types of micro-organisms. Thus the chemical, physical and bacteriological aspects are all involved in the complete definition of a soil concept.

The soils of Kerala State may be classified for convenience sake into five viz., sandy soils, alluvial soils, laterite and red soils, peaty soils and forest hill soils. The salient features of these different categories of soils are given below:

Sandy Soils

Sandy soils run as a narrow belt, ranging in width from 1 km. to 7 km., all along the west coast of Kerala. These soils differ in texture from occasional sandy loams to unproductive pure sand. Most of the sandy areas are poor in major plant nutrients (N. P. K.) lime and organic matter content and are slightly acid to neutral in reaction.

Coconut which is by far the most important crop of Kerala is extensively cultivated in these sandy regions. The tract known as Onattukara comprising the taluks of Karunagapally, Karthigapally and Kuttanad, although predominantly sandy is an important

rice growing region in the State. Several other crops are also grown in the sandy belt. The sandy soils of Kerala require heavy fertilizer application and organic matter incorporation for successful crop production.

Alluvial Soils

Alluvial soils are found on the banks of rivers, are transported soils covering the entire Kuttanad tract which is the rice bowl of Travancore. The 'Kole' lands of Trichur and Mukundapuram taluks also belong to this classification. Alluvial soils are heavy in texture. They are generally endowed with organic matter, nitrogen and potash but are deficient in phosphate and lime. Most of the alluvial soils are subject to periodical inundation with salt water and hence strongly acidic in reaction.

The alluvial soils cover a total area of about 1,035 sq. kms. Although rice is the major crop in this area, many other crops like coconut, sugarcane and bananas are also extensively grown.

Laterite Red Soils

Laterite soils are by far the most important group occurring in Kerala and cover the largest area. Formed by the weathering mainly of acidic rocks under alternate wet and dry tropical conditions, they usually developed in regions of heavy rainfall (over 250 cm) and high temperature. Typical laterite soils are characterised by a vesicular structure and the accumulation of hydrated oxides of iron and aluminium Most of the bases and silica have been removed by drastic leaching. Laterite soils vary in depth from 1.8 to 3 metres and may have a thick layer of kaolin clay below. At or near the water-table the soil material is soft and can be cut into blocks which harden on exposure. This material makes excellent bricks for building purposes.

Laterite soils do not manifest typical clay properties, such as, plasticity, cohesion, expansion and shrinkage to any great extent. They are porous and well drained and have poor capacity for retaining moisture. The base exchange capacity of these soils is low.

Laterite soils are usually of low natural fertility. They contain fair amounts of organic matter and nitrogen but are very deficient in phosphate, potash and lime. Phosphate fertilization poses serious problem in these soils because of 'fixation', which

implies, conversion of soluble phosphates into insoluble and largely unavailable compounds of iron and aluminium. Laterite soils are acidic in reaction. Laterite soils though of low fertility status respond well to good cultivation and judicious application of fertilizers.

In some regions of Kerala where the rainfall is only 150-175 cm., the soils have not developed into true laterites. There is an accumulation of iron and aluminium in these soils and they show many of the properties of laterites. They do not have the vesicular structure, however, which is peculiar to true laterites. These soils are called lateritic or red soils.

Red soils are found in parts of Trivandrum and Neyyattinkara taluks and they occupy a very small area. The deep red colour of these soils is due to haematite or anhydrous ferric oxide. The majority of red soils are loam. They are deficient in organic matter and low in all the major plant foods and lime. But they respond well to good agronomic practices because of their favourable loamy texture. Red soils are acidic in reaction.

Laterites and red soils occupy about 66% of the total cultivated area. Almost every crop grown in the State is cultivated on laterite soils. They include paddy, coconut, tapioca, rubber, pepper, ginger, bananas, sugarcane, arecanut and cashewnut. It is to be noted that the broad belt of land lying between the sea and the eastern hilly regions of the State, varying in width from 50 to 100 km. is a lateritic belt and the States, agriculture is mainly confined to laterite soils.

Peaty Soils

The Peaty or *Kari* soils of Kerala are a peculiar formation. They occur in taluks of Kuttanad, Vaikom, Shertallai and Kunnathunad, and cover an area of about 20,000 hectares. *Kari* soils are characterised by a deep black colour, high content of organic matter and very strong acidity (PK below 4.5). They are rich in nitrogen but seriously deficient in phosphate and lime. The level of potash is fairly satisfactory. In their natural state the *Kari* soils are very infertile owing to poor nitrification, presence of toxic concentration of water soluble salts, high content of iron and aluminium, and oxidation-reduction reactions leading to the production of free mineral acid.

The *Kari* soils occur in and around backwaters. The organic matter content of these soils varies from 20 per cent to 60 per cent and consists mainly of undecomposed woody residues which are found at or near the surface. The *Kari* soils are believed to have been formed by natural disturbances and consequent submergence of forest areas under the sea, which later receded.

Kari soils are noted for their infertility and low crop yields. The main crop grown on these soils is paddy and the average yield is only about 320 kg. per acre. Experimental reclamation measures in *Kari* areas have met with remarkable success and reclaimed areas have given yields of over 1,350 kg. of paddy per acre. The reclamation measures include prevention of entry of saline water from the sea, liberal lime and phosphate fertilization and the use of acid resistant varieties of paddy.

Forest and Hill Soils

Forest and hill-soils occupy about 26 per cent of the total area of the State. They are characterised by a surface layer of organic matter derived from forest growths. These soils are generally rich in nitrogen and other plant foods. When the forests are cleared, these soils undergo laterization. Plantation crops such as, tea, cardamom and rubber are extensively grown on cleared forest soils. These soils are rather strongly acidic in reaction and of high natural fertility.

In addition to the above mentioned groups, black soils are found in Chittoor and Palghat taluks but these cover only a small area. They are usually deficient in all the major plant foods and are neutral to slightly alkaline in reaction. Cotton and groundnut are the crops grown in these soils.*

* Adapted from Farmers of India, Vol. II, pp. 299-303—Indian Council of Agricultural Research, New Delhi. 1961.

Cropping pattern

Kerala is a State having the mixed cropping pattern. Perennial crops like coconut, arecanut, jack, etc., cereal crops, pulses and a variety of hill crops like rubber, cardamom, coffee, tea, etc., are grown in the different parts of the State. A notable feature of the agricultural sector in the State is the high intensity of cropping which can be measured by the ratio of the gross cropped area to the net area sown. The intensity of cropping during the year 1970-71 was 135%. At the district level the intensity varies from 116.2 to 117.2. The percentage of net area to geographical area of the State is 56.3 which shows the high utility of the land in Kerala. The diversity of the crops and the heterogenity in cultivation are peculiar to this State. The list of important crops grown in the State according to standard classification is given below:—

I. FOOD CROPS

A. *Food Grains*

(i) Cereals:—(a) Paddy, (b) Jowar, (c) Ragi, (d) Other cereals, (ii) Pulses.

B. *Sugar crops*

(i) Sugarcane, (ii) Others.

C. *Condiments and spices*

(i) Pepper, (ii) Arecanut, (iii) Cardamom, (iv) Ginger, (v) Turmeric, (vi) Chillies, (vii) Others.

D. *Fruits and vegetables*

(i) Fresh Fruits:—(a) Mango, (b) Banana, (c) Other plantains, (d) Citrus fruits, (e) Others. (ii) Dried Fruits.—(a) Cashew, (b) Others (iii) Vegetables:—(a) Tapioca, (b) Sweet potatoes, (c) Onion, (d) Others.

II. NON FOOD CROPS

A. *Oil Seeds*

(i) Coconut, (ii) Groundnut, (iii) Sesamum, (iv) Castor, (v) Others.

B. *Fibres*

(i) Cotton, (ii) Others.

C. *Drugs. Narcotics and Plantation Crops*

(i) Rubber, (ii) Tea, (iii) Coffee, (iv) Tobacco, (v) Others.

D. *Other non-food Crops*

(i) Fodder, (ii) Green manure, (iii) Others.

In the cropping pattern of the State, rice occupies the pride of place covering 29% of the total cropped area in the State followed by coconut with 24% during the year 1976-77. The area under rice is the gross area cultivated in the three crop seasons namely Autumn, Winter and Summer. 45% of the gross area under rice is raised during the Autumn season and 44% during Winter season. Summer season covers the rest. Tapioca is the third major crop raised in the State and it accounts for 11% of the gross area cultivated. The three crops together account for about 64% of the gross cultivated area in the State. Pepper, ginger, turmeric and cardamom are the most important crops raised under the spices group and they together account for about 6% of the gross area cultivated. Rubber and cashewnut are other two important cash crops and these two crops together account for about 11% of the total area cultivated. Tea and coffee are the other two major plantation crops in the State and they together hold about 2.6% of the gross area under cultivation. Betelnuts occupy about 2.3% of the cultivated area. Pulses sugarcane, palmyrah, banana and other plantains fruits, vegetables, cotton etc., account for the rest of the area cultivated.

Crops and Agricultural practices

Out of a total area of 38.85 lakh hectares only 31.62 lakh hectares are available for cultivation in Kerala. If cultivable wastes and fallow lands are not taken into account, the net area would be only about 29 lakhs. The State has the highest density of population in India and the pressure on land can, therefore, be well imagined. There is little scope for extending the area under cultivation as forests, hills and uncultivable lands spread over vast portions of the State. Forests alone cover more than one-fourth of the total area.

Eighty-eight per cent of the holdings in Kerala are less than 1 hectare in size. Only 1.4 per cent are above 25 acres. This shows a high order of concentration of holdings in this group consequent to the implementation of the holdings but takes as much as 4.1% of the total area operated. The uneven distribution of land may be judged from the fact that only 8 per cent of the total area is owned by those whose holdings are below 4 hectares each, while 50 per cent of the total land is in the hands of a small minority which constitutes just about 4 per cent of the land owners in the State.

Until recently, the State had no major irrigation projects, though minor irrigation facilities were available in many parts. The acute shortage of food experienced during the war and post-war years brought into focus the need for major irrigation schemes, and this led to the sponsoring of a number of projects such as the Chalakudy Scheme, the Peechi and the Vadakkancherry Schemes and Malampuzha, Mangalam and Walayar Projects. The total area irrigated in 1955-56 from canals was 3.96 lakh acres (1.60 lakh hectares). Tanks and wells provided irrigation to another 1.06 lakh acres (0.43 lakh hectares). The rest of the area was dependent mostly on rainfall.

Nearly 40 per cent of the total cropped area in the State is under food crops of which rice is by far the most important. The other cereals like jowar and ragi are cultivated only on a limited scale. Tapioca is, however, grown extensively and serves as food for a large sector of the population. The plantation crops are the most valuable from the agriculturist's point of view. Kerala accounts for about 90 per cent of pepper, 60 per cent of cardamom, 80 per cent of cashew, 95 per cent of rubber, 65 per cent of arecanut, 70 per cent of coconut and nearly the entire quantity of lemongrass oil produced in India. The total value of agricultural production in the State was estimated at Rs. 180 crores in 1955-56. Paddy and coconut together contributed about half of this. The balance came mostly from the plantation crops. A brief account of the major crops in the State and of the agricultural practices followed is given below:

Paddy (Nellu) (Oryza Sativa Linn)

Paddy cultivation extends over nearly 28 per cent of the total cropped area. The main rice growing tracts are: the coastal saline area including the *kaippad* or *pokkali* areas in central Kerala; the central laterite region which runs parallel to the sea between the coastal belt and the Ghats; the sandy loam tract of Onattukara; the Kuttanad submerged area (the Netherlands of Kerala) and the upland paddy area which consists of long narrow winding paddy fields in the valleys between the hills. In all these parts the crop is raised mostly as a rainfed crop, though irrigation facilities are now being provided on an increasing scale.

One to three crops of paddy are raised annually depending on the availability of irrigation facilities. The first crop or *virupu* is grown from May to October; the second crop known as *mundakan* is obtained between September and February, and the third crop

called *punja* which is an irrigated crop of comparatively minor importance is between January and May. About 50 varieties of rice are known to be grown in different parts of the State.

The seed is generally sown broadcast for the first crop after preparing the fields thoroughly. About five cart-loads of mixture of dry cattle manure and ash are applied per acre while preparing the land. A high seed rate up to 90 Kg. or more per hectare is generally employed. The crop is ready within 4 to 6 months. In high level house compounds or *parambu* areas, sometimes, a supplementary dry crop or *modan* is also raised with the commencement of the South-west monsoon.

After harvesting the first crop, the fields are prepared for the *mundakan*, which is a more intensively cultivated crop. This second crop is grown by transplanting seedlings in puddle. The cultural practices are more or less of the type employed in the Japanese method of paddy cultivation. The *mundakan* is gaining in importance as it provides great scope for intensive cultivation wherever the land resources are limited.

The third crop or the *punja* is restricted to small low-level areas where water supply is abundant during the summer months. The out-turn is usually small and the *punja* proves costly especially as the varieties grown yield little profit.

In some parts of North Kerala a pulse crop, like green gram or black gram mixed with green manure crop is raised immediately after the *mundakan is harvested.* In the Onattukara region, a crop is gingelly (*til*) is taken during December-March.

The cultivation of paddy in the backwater or *Kayal* areas presents special features which may be described in some detail. No crop can be grown in these parts during the monsoon season when inland water flood the lakes. Cultivation is also not possible after April when the sea water enters the areas. To control the flow of water strong bunds are constructed and a number of water channels are provided to drain the over-flow.

Near Trichur about 8,100 hectares of paddy area are under *Kole* cultivation which is a peculiar system of cultivating paddy under submerged conditions. At the end of the monsoon water inside the large lakes is pumped out with the help of water wheels or power-driven pumps which are kept working day and night. Afterwards, field bunds are formed, the land is prepared for cultivation, and paddy seedlings are transplanted. Occasionally

during the pre-monsoon showers, the area gets flooded. When this happens the excess water is removed by using water wheels. Sometimes, even harvesting has to be done in boats. Good yields are obtained in normal years. On lands situated near the *kole* areas, a long-duration variety, known as *kuttadan* is grown during May-February. The tall stubbles left in the fields after the harvest are burnt. Next the area is ploughed and the seed sown broadcast. When the water level rises in the lake fields the *kuttadan* stalks automatically lengthen and rise above the water level. The yields are usually good.

The Kuttanad lake area extends over 750 sq. kms. and the bottom of the lake is several inches below the sea level. The area remains submerged for a greater part of the year and is de-watered after the monsoon is over. There are special large sluice gates which can be opened and shut to let the flood water flow into the sea and to prevent sea water flooding the lake. All the habitations in the area are situated on islands of varying sizes and the only communication between them is through boats. Rice cultivation in Kuttanad is a demonstration of what human endeavour can accomplish even without elaborate equipment. The area is divided into blocks of convenient sizes (20 to 80 hectares each) with embankments all around built with the mud taken from the bottom of the lake. Immediately after the monsoon period. the water is pumped out of the blocks with the help of electric pumps till only a few inches of it are left. The soil is then puddled and levelled and sown with paddy. The water in the channels surrounding the blocks is always at a higher level and can be turned into the fields whenever needed. Only varieties that take 100 to 120 days to mature are grown. The area is divided into three classes viz., *punja*, *kayal* and *kari*, according to the physical conditions and the varieties grown. Yields of thousand kilograms of paddy per hectare are not uncommon. Ploughing is done soon after harvest. Of late tractors are used for the initial ploughing mostly in the *Kayal* area.

Paddy is also cultivated in the forests at the foot of the Ghats and on the slopes of the hills. This is called *punam* cultivation. A patch of forest is cleared by cutting and burning the trees and the land prepared for cultivation. The seed is sown in April, and the crop requires little attention apart from occasional weeding. Harvesting takes place in September. The virgin soil is very fertile and the yields are high. *Punam* cultivation is common in the northern taluks of the State.

Varieties

A number of varieties of paddy is grown, known by different local names among agriculturists. The Department of Agriculture and the Kerala Agricultural University have evolved a few improved strains and are trying to popularise them. The object is to cover a major portion of the rice area with improved varieties so as to increase the average yield of rice. The average productivity of rice has been estimated at 1,632 kg./H. a. (1983-84). There is considerable scope for raising this yield by pursuing efficient methods of cultivation as evidenced by the yields obtained in competitions.

Paddy crop in Saline soil

Paddy cultivation in saline soils is a unique system prevalent in Kerala. Popular in the coastal belt of the State nearly two-third of this Pokkali cultivation is in Ernakulam district. The name is synonymous with the 'Kaipad' cultivation in Cannanore district and 'Kariland' cultivation in Alleppey district which are the other two major districts adopting this type of cultivation.

It is estimated that nearly 20,000 hectares of saline soils are under cultivation in Ernakulam district, 3,000 hectares in Alleppey district and 2,000 in Cannanore district. All the other coastal districts put together have about 1,400 hectares of land under this type of cultivation.

The lands for Pokkali cultivation are low lying marshes and swamps situated near the estuaries of streams and rivers not far from the sea. They are water logged with a poor drainage system and are subject to tidal action throughout the year with a tidal amplitude of about one metre. The soil is stiff impervious clay but rich in organic matter. It is bluish black in colour and is hard and creates deep fissures when dry and sticky when wet.

More than 95 per cent of the total area are single crop lands. These lands are cultivated during the first crop season (Viruppu) from May-June to September-October. The Rice Research Centre of the Kerala Agricultural University has released so far three special varieties for cultivation in these lands, the basic requirements of the seeds being that plant height should not be less than 125 cms. total duration not more than 125 days and with tolerance to saline acidity.

The latest variety released 'Vytilla three' has a height of 166 cms. and duration of 115 days. The yield potential of this variety is said to be higher than the earlier two varieties—about 2,000 kgs. per hectare.

Under the special cultivation procedure when the soil becomes dry it is heaped up to form mounds with about one metre base and half a metre height during March and April. These mounds dry up in the summer and when the monsoon sets in May-June, the salt in the soil is washed away along with the water.

A special method is adopted for sprouting the seeds also. They are tightly packed in country baskets made of pleated coconut leaves the inside of which is lined with banana or teak leaves. These baskets are then immersed in fresh water ponds for 12 to 15 hours after which they are taken out and stored in shade. The radicle just sprouts out and remains quiscent under that condition for more than 30 days.

When the soil and weather conditions become favourable for sowing, the baskets containing seeds are resoaked for three to six hours to make the radicle grow again. The tops of the mounds in the field are levelled and the sprouted seeds sown on them which act as nursery.

The Pokkali varieties have early seedling vigour and they attain a height of 40 to 45 cms. in 30 to 35 days. At this stage the mounds are levelled and uniformly spread in the field the seedlings being tall enough survive in the flooded field condition. The clods of earth attached to the clumps give anchorage to the seedlings.

However, during the monsoon the flooding was more than normal and according to official estimates crop on at least 10,000 hectares in Ernakulam district would have been lost. In some fields the seedlings may survive and in that case the yield will be paradoxically high because the floods in their wake would have brought in and deposited fertile silt and soil all over.

After the harvest these lands can be used for fisheries which enables the farmer to make extra money.

Tapioca (Manihot utilissma Pohl)

Tapioca occupies a place which is only next in importance to rice as a staple food of the people of the State. It is contended

that this tuber crop produces 2½ times more calories and energy food than any cultivated cereal from the same extent of land. The density of population and the smallness of the area available per head make the large scale cultivation of tapioca an economic necessity in Kerala. Tapioca is said to have been introduced by the Portuguese in the Malabar area during 17th century. Visakom Thirunal, the Maharaja of Travancore (1880-1885) did yeomen service in spreading the cultivation of this valuable food crop in Travancore. Today many varieties of tapioca ranging in duration from six to twelve months are cultivated on all types of land in Kerala from the coast line upto an elevation of 1,000 metres. After the land is cleared, cuttings are planted, generally during the two monsoon seasons and sometimes also in December, but in the latter case the plants require watering till they put forth two or three leaves. A dry situation is preferable as otherwise the roots may decay and perish. So instead of planting the cuttings in trenches, the ryots sometimes turn the soil and plant them as heaps of earth with trenches around for water to gather and flow away. The crop matures in nine to eleven months. Large quantities of starch are present in the tubers. The tubers are used for food in various ways. They are boiled and used directly as food. The tubers are also scraped, washed and then converted into pulp by mechanical contrivances. Tapioca flour is suitable for manufacture of starch of sago. Tapioca flour is now exported even to foreign countries. Cut into small bits and dried in the sun it can be kept for a long time without deterioration. 41.33 lakh tonnes of tapioca were cultivated during 1983-84 in 22.7 lakh hectares with an average yield of 18, 197 kg./h.a.

Sugarcane

Among the sugar crops, sugarcane is the most important. The main sugarcane growing areas are Mavelikara, Koipuram, Mallappally, Pandalam, Tiruvalla, Chittur and Palghat. Sugarcane cultivation extended over 7,990 hectares in the State in 1984-85. The total production was 85,732 tonnes of gur. The sugarcane as normally cultivated is of about 10-12 months duration. Warmth and humidity during the growing stage and dry chilly weather at maturity are ideal for the crop. Sugarcane is a long duration exhaustive crop and so it thrives best in fertile soils with good drainage facilities. The crop is however cultivated on a variety of soils namely clay soils, clay loams, red loams and sandy loams. In wet lands sugarcane is sometimes rotated with rice leaving an interval of at least two years. The land is ploughed a number of times fairly deep till the required tilth is obtained. The main

planting season is March-April but in some parts it commences from the middle of January. Before planting the land is levelled and laid out into ridges and furrows at distances of about 1 metre. Sugarcane is heavily manured. Unfailing water supply is essential throughout the growth period of the crop. Weeding and hoeing, filling gane, trenching and earthing up wrapping and propping trashing and removal of shoots are the main after-cultivation operations. The period when canes attain the maximum sucrose depends on the age time of planting and variety. In general it can be said that canes when planted in February-April attain maturity in twelve months. Harvest of canes is done with heavy knives or hatchets. The canes are cut flush with the ground level or even two to four inches below the ground. Soon after harvest, the canes are stripped of the trash (dry leaves). This is done with the sickle. The trash is used as fuel for furnaces in jaggery making.

Pulses

Pulses are grown on nearly 30,000 hectares yielding about 22,000 tonnes. The average productivity is estimated at 735 tonnes per hectare. Pulses are now increasingly raised as second or even third crop by availing of the moisture left in the soil after the harvest of paddy. The cultivation of pulses is done with a view to increasing crop intensity and to enrich soils by including a legume in the rotation. Of the pulses, only black gram, green gram, horse gram and cowpea are described here, as they alone are largely cultivated in the State.

Black gram (Phaseolus mungo) and green gram (Phaseolus aureus) grow luxuriantly in soils containing lime. Two crops of the black gram and green gram are raised during the monsoon period. The South-west monsoon cultivation takes a longer time than the other. It is sown in *Meenam* (March-April) and harvested in *Mithunam* (May-June). The north-east monsoon crop is sown in *Thulam* (October-November) and harvested in Dhanu (December-January).

The mode of cultivation is the same for both kinds of grams. The ground is first ploughed, made even and then divided into small plots. The soil is ploughed again and hand-hoed. Ash is the usual manure and it is applied before sowing. The seed is then sown, five or six *Edangazhis* on an average, for one acre of land. The ground is ploughed again a third time. In the selection of seeds care is taken that they keep their

proper colour that their sprouting portions stand prominent, and that they are not damaged. Grains smaller in size than the average ones are considered bad seeds. Black gram and green gram generally grow to a height of forty five to sixty centimetres The plants of these pulses are plucked root and branch when the pods have all become ripe. They are then dried and beaten and the seeds separated. The cost of cultivation is very much the same for all classes of grams.

The cultivation of horse gram *(Dolichos biflorus)* is limited to the laterite soils of the midlands. Even in these areas no large scale or systematic cultivation is practised. It is more often grown in fully dry lands with undulating terrain as a mixed crop with tapioca in alternating rows. The sowing is done broadcast in longitudinal strips. Except for initial preparation of the land by digging or ploughing no other inter-cultivation operations are usually done. Manuring is also seldom practised. Moreover, application of a phosphatic fertiliser as basal dressing has yielded very good results. The cropping season is from November-December to February-March. Harvesting is done by pulling out the plants, drying in the sun and beating lightly with sticks which separates the seed from the pods and straw. The yield is only 200-300 kgs. per hectare. No improved varieties have been evolved or introduced in the State.

Cowpea *(Vigna catjang, Walp)* in another important pulse crop grown all over the State. The field is prepared by digging or ploughing and the seed is grown broadcast. In some areas the sowing is done in small raised beds. A basal dressing of wood ash is usually applied. Sowing is done in June. Very little after care is given to the crop. Harvesting is done by hand picking in stages as the pods become mature. Flowering occurs in three or four flushes. The main cropping season is from June to August.

Oil Seeds

Among the oil seeds the most important are coconut and sesamum.

Coconut (Cocos Nucifera L)

The coconut tree was first introduced into Kerala between the dates of the Periplus and Cosmos, the first and sixth century A. D. Purchase speaks of it as "the most profitable tree

in the world". Marco Polo describes the nut "of the size of a man's head containing an edible substance that is sweet and pleasant to the taste and white as milk. The cavity of this pulp is filled with a liquid clear as water, cool and better flavoured and more delicate than wine or any other kind of drink whatever".

There is a proverb in Malayalam which says that no part of the coconut tree is wasted. This is literally true. It is called in Malayalam Kalpa Vriksha or 'Tree of the Heaven'. The trunk of the tree is used as building material as well as for making ornamental furniture, walking sticks, etc.; the leaves are used for thatching houses; the nuts are used as food, copra and for extracting coconut oil; the shells serve as fuel; the sap provides toddy and brown sugar; the coconut water is one of the most refreshing drinks; the husks of the nuts are made into fibre for the manufacture of coir, yarn, rope and mats. The two major industries in the State, coconut oil and coir making, depend directly on the cultivation of the coconut palm.

The coconut palm thrives best on the alluvial deposits found near the backwaters in the coastal tract. It also grows in abundance on the lower slopes of the laterite hills in the interior. The annual production is valued at about Rs. 800 crores. All the taluks cultivate it to a greater or lesser extent. Several varieties of the tree are met with. The leading commercial variety known as 'West coast tall', exhibits different sizes, shapes and colour of nuts and petioles. A medium hill variety known as 'Jappanan' is also met with, but it is not grown for commercial production of nuts. It is probably an exotic variety introduced from Ceylon. A dwarf yellow variety known as 'Gowligatram' with yellowish coloured petioles and nuts is grown as an ornamental variety. Of late inter varietal crosses like T x D (Tall x Dwarf) and D x T (Dwarf x Tall) etc. are cultivated.

The coconut is an inter-tropical tree which is extensively grown in sandy tracts along the coast, on the banks of rivers, lakes, tanks, and canals and in low lying valleys. With a little care it will grow on the hill tops, in deep ravines, in the precipitous slopes and in the interstices between rocks. It is ubiquitous. It may be safely said that there is not a single ryot who does not own at least one coconut tree in his name. It bears all the year round and its uses are infinite. The trunk of the mature tree is used in the construction of houses, the leaves are plaited for purposes of thatching them, inflorescences are tapped for toddy, and the stem and shell are used for fuel.

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It is, however, the nut that forms its most important part. Coconut oil, copra, coir yarn and rope are some of the important products of the nut. The oil is used both for edible and industrial purposes. It is an important ingredient in the manufacture of soap. The shell of the coconut serves as a medium for the expression of some of the finest forms of craftsmanship of the East.

In the sandy tracts of the State where coconut cultivation is easy and inexpensive the tree is planted in every available acre while in the laterite regions where the cultivation is comparatively expensive and difficult, it is usually planted in the vicinity of backwaters and estuaries and on the lower slopes of the hills that surround paddy fields. For propagation fully matured nuts from old trees are selected. They are dried in the sun for some days and then soaked in water for ten to twenty days. They are then buried in rich loamy soil with the tops showing above ground. The nuts begin to sprout in about three months and the seedlings are planted within a year in pits just before the outbreak of the south-west monsoon. Ash is often buried with the seedlings and sometimes a handful of salt also to keep away the attack of pests. The plants are watered everywhere in the hot season for the first three years and the pits are gradually filled up, partly with soil washed in by rain, and partly with green leaves, wood ash and cattle dung. All that is necessary thereafter is to plough up the soil at least once a year and to dig shallow trenches round the trees and fill them up with manure. The trenches are usually dug during the monsoons. The time required for the coconut trees to come into bearing differs with the different varieties of the tree and the nature of the soils in which they are grown. When the trees begin to flower for the first time, a trial is made by cutting a flowering branch to determine whether they will be fit for producing nuts or only palm wine (toddy). If the cut bleeds profusely, then the tree is considered more suitable for tapping. In good soil, the tree yields juice all the year round, but in poor soil it exhausts in six months. The juice is distilled into arrack. On an average the trees come into full bearing about the tenth year. In the case of improved varieties like T x D, the trees come into bearing in the fourth year. They bear vigorously for about thirty years and then begin to decline. The nuts are plucked six or eight times in the year, but larger number of nuts are plucked during the period from February to July.

Sesamum (Sesamum indicum Linn) (Ellu)

Sesamum is an annual plant growing to a height of one metre. It is cultivated for the oil which is extracted from its seeds. There are two varieties of the crop, one whitish and the other black. The latter is the more common of the two and is known as first sort sesamum because it yields the largest percentage of oil, viz., 43 per cent. The soil best suited for the cultivation of sesamum is well drained alluvial loam. The land is ploughed and harrowed and the seed sown at the rate of ten kg. per hectare. It is largely used for culinary purposes. in anointing the body, in soap manufacture, occasionally as an illuminant, and sometimes in adulterating ghee. In many of its properties it resembles the olive oil. The oil from the black variety Sesamum is generally believed tot be better suited for medicinal purposes than that of the white. It is also extensively used in the manufacture of perfumes. The oil-cake left after extraction of the oil is in demand all over India as a cattle feed and in times of famine it is also eaten by the poorer classes of the people.

The yield per hectare, oil extraction percentage and quality of oil obtained are higher in the sandy soils than in other types of soils. Sesamum requires very little moisture for its growth, heavy rainfall even proving ruinous to the crop.

The seed is sown broadcast in wet land paddy fields after the *Mundakan* paddy crop in January-February. Since the seed is very small and light, sprouting and satisfactory growth depends on very thorough preparation of the field which leaves a soft seed bed. A basal dressing of farm yard manure and ash is usually given at the last ploughing before sowing. After the seeds are sown broadcast a light harrowing is given by means of wooden toothed harrows known as "Pallu" so as to cover the seed lightly. Two or three inter-cultivations are given by means of narrow-bladed spades. Thinning of the crop is also done during the inter-cultivation. A thick stand reduces branching and lowers yield. Thinning is done so as to leave a spacing of about 30 Cms. between healthy plants. Ash is applied during the inter-cultivations and highly mixed with the soil.

The season is from January to April. Light summer showers during the growing season are beneficial to the crop while heavy rains and water stagnation are ruinous. Harvesting is done during early April by pulling out the plants when

the majority of capsules have ripened. The harvested plants are stacked in bundles after cutting off the root portion for two or three days so that the leaves dry up and fall off. Then the plants are spread out and dried in the sun when the capsules burst open releasing the seeds. Light beating with sticks is also resorted to for separating the seeds from the capsules. The seeds are dried in the sum for three days then winnowed. The average yield is about 225-400 kg. per hectare.

Groundnut (Arachis hypogoeas, Nilakadala)

The groundnut is grown in 10,000 hectares. The groundnut crop is mostly raised under rain-fed conditions from June-July to December-January. It is also cultivated as a summer crop under irrigated conditions from February-March to June-July in some areas. The crop is grown on a variety of soils. Normally two inter-cultivations are given. The crop is harvested when the vines begin to turn yellow and the inside of the shell turns dark.

The production of groundnut was nearly 9000 tonnes in 1983-84, with an average yield of 883 kg. per hectare.

Cotton

Palghat is the only district where cotton is cultivated. The area under cotton cultivation in the district in 1983-84 was 5,900 hectares.

It is cultivated in a variety of soils. However the cultivation is restricted to red and reddish loams. It is planted usually in September-October. The crop matures roughly in six to seven months. Rain is essential for the growth of the crop. The harvests are completed by April.

The production of cotton in the State in 1983-84 was 9,523 bales of 170 kg. with an average productivity of 1.61 bales per hectare.

Spices and condiments

The spices of Kerala have always attracted the attention of foreign nations and it was in fact the desire to enrich themselves by trade in these articles that brought European nations

to India. The most important among them are black pepper, ginger, turmeric and cardamom. The foreign exchange earned through the export of these spices is considerable. The more important of them are briefly described below.

Pepper (Kurumulaku) (Piper nigrum Linn)

Of all the spices of Kerala pepper is the most famous. It was "the magnet which drew first the Moors and the Portuguese to Malabar". It was called "Malabar money and was the chief attraction for the European nations to trade with the East. When the Dutch took pepper saplings from Malabar in the 18th century to plant in Sumatra, the Zamorin, expressed the hope that Malabar's supremacy in pepper would be invincible".[1]

Kerala produces 98% of the total production of black pepper in India. Being a rain-fed, crop, pepper grows best where there is an average rainfalll of about 200 cms. It grows in places with altitude less than 1,000 metres. The suitable soils for pepper cultivation are clay loam, red loam or sandy loam soils, the first being the most suitable. The crop is propagated vegetatively by means of cuttings. Jack and mango trees are commonly used as supports for the vines. On a plantation basis they are planted at a distance of 3 metres apart. The vine is rarely allowed to grow beyond a height of 6 metres lest the picking of the pepper berries should become difficult. The vines begin to bear after three years of planting. The harvesting period is from December to March. The berries are allowed to dry in the sun in mats for a week till the colour becomes black. Sometimes the skin of the ripe berries is removed before drying. This kind of pepper is known as white pepper and is produced only in limited quantities. The yield mainly depends upon the fertility of the soil and the locality. Usually in an hectare there will be 750 to 1000 standards, where pepper is cultivated on a plantation scale. The dried black pepper is graded and packed, usually in double gunny bags. It is mainly exported to United States of America and United Kingdom.

The pepper plant is grown on living trees or other supports known as 'standards'. It is a perenniel shrub which lasts in the

[1] Report of the Malabar Tenancy Committee, p. 14.

plantations for 25 or 30 years, although in some, of the well-maintained gardens, the life of the vines has been found to be over 60 years. It grows from almost sea level up to an altitude of 1067 metres above the mean sea level but the coastal sandy regions are not found very suitable for the successful cultivation of the crop. Pepper is an unirrigated crop which is raised solely with the help of the monsoon rains. Being a tropical plant, it thrives best in humid and moist climate and in regions where the average asnual rainfall is well over 204 centimetres. Places having an average rainfall of less than 127 centimetres are not considered suitable for the cultivation of pepper. The crop tolerates a minimum temperature of 50° F. and a maximum of 104° F. The propagation of the crop is done vegetatively by means of cuttings.

The pepper vine is a woody climber and requires some support for growing. The supports or 'standards' used for the purpose in Indonesia, Borneo and other countries of South East Asia consist of dead-wood posts, but in India, invariably living trees are preferred. Any of the existing jungle trees are used for the purpose or sometimes seedlings of the local *Murukku* tree (Erythrina indica) are specially planted at regular distance of about 3 metres and the pepper vines are planted at the base of these 'standards'. The vine grows quickly on this standards' and covers it with its dark green foliage and forms into the shape of a bush around the 'standard'. Though the pepper vine grows to a height of 10 metres and more depending upon the growth of the 'standard' each bush is not allowed to grow beyond 6 metres in order to facilitate the picking of the pepper spikes when mature.

The vines begin to flower from the middle of July, and depending upon the varieties planted, the berries become ripe for harvest during the period from January to March. When ripe, they assume a beautiful orange or cherry colour. The fruits, which are small berries carried on slender spikes, begin to appear from the third year after planting. The out-turn of the crop is poor at the first harvest and goes on increasing up to the sixth year; from the seventh year onwards full yield can be expected from the plantations.

The preparation of commercial black pepper from the harvested berries is simple. The whole spikes with the berries are spread on a mat or clean floor and rubbed between the hands or trampled under feet in order to separate the berries. These are then dried in the sun for 5 or 6 days. When fully dry the outer skin becomes black in colour and shrunken in size and assumes the characteristic wrinkled appearance of the black pepper of commerce. The Indian supply consists mostly of this quality of pepper.

Ginger (Dry) (Inchi) (Zingibar officinale rose)

Ginger is a valuable article of export from Kerala. Marco Polo refers to its production in great quantity along with pepper and turbit and "the nuts of India" (coconut). Regarding the exports from Malabar, it is worthy of note that, "in the detail of 3 cargoes that arrived in Lisbon in September 1504, we find the following proportions:—Pepper, 10,000 *cantars*, cinnamon,, 500; cloves, 450; z. z. (i.e. Zen Zorco, ginger). 130; lac and brazil, 730; camphor, 7; cubebs, 191; mace, 2½ spikenard, 3; lignaloes, 1½[1].

In 1983-84 Kerala had nearly 13,113 hectares under ginger. The methods of cultivation are simple and the chief factors in the success of the crop are well-drained sandy clay loam, red loam or laterite soils and a timely rainfall. Operations begin in the first week of May. The ground is cleared of stones, stubble and the rank growth of the previous monsoon, and is then ploughed six times. Towards the end of the month the rhizomes are planted out in raised beds 3 6 m. long by 0.6 m. broad, separated one from another by shallow trenches. In these beds shallow pits, about 10 cm. square, are made at intervals of 30 cm., and in each pit a rhizome is placed on a small quantity of cattle manure. The rhizomes are then covered lightly with earth, and are protected from the sun by a covering of leaves and brackets. *Chembu*. is often grown as a mixed crop. Six weeks later fresh leaves and branches are put down, and the opportunity is taken to weed the beds, and by heaping up mud round the edges to repair the ravages wrought on them by the heavy rains of the first monsoon. After another six weeks, in September, the process is repeated and the covering of leaves and branches renewed. The rhizomes mature in the month of Dhanu (December-January), and are hoed up. The yield is generally eight to ten times of the seed rate. But usually in Kerala the average yield of ginger (dry) is about 2,500 kg. per hectare.

Cardamom (Elettaria Cardamom—Elakka)

Cardamom is an important spice crop of Kerala which earns considerable foreign exchange for the country on account of its valuable use in allopathic medicines and the essential oil which it contains. It is almost entirely a South Indian product and is cultivated in the hilly forest regions of Karnataka, Tamil Nadu and Kerala. In Kerala State Cardamom is largely used as a massticatory flavouring in cocking, confectionery and medicinal preparations. The total area under Cardamom in the State in 1983-84

[1] Marco Polo, Vol. II, P. 391.

was about 54,516 hectares and production 1,100 tonnes. The cultivation of the crop is mainly confined to Udumbanchola, Devikulam and Peermede taluks.

Cardamom is grown on well drained forest soils, holding a good growth ever green forest, heavy humus accumulation, and adequate moisture. It thrives on elevations ranging from 610 metres to 1,575 metres above M. S. L. and requires a well distributed annual rainfall of 150 to 375 cms. Thus a cool and constantly moist atmosphere is favoured by this crop. The forest area selected for the plantation is prepared by clearing the undergrowth and thinning out the shade trees to give optimum shade. In areas where shade is insufficient or sparse, shade trees with tall and spreading habit are planted to attain the optimum shade required for cardamom.

Cardamom is propagated either by planting rhizomes or by growing seeds in nurseries and transplanting the seedlings in the field. One advantage in planting rhizomes is that it comes to yield much earlier than the seedlings raised from seeds. Pits of size 75 cm. x 75 cm. x 30 cm. are taken during March-April in the land already prepared at spacing of 2.5 m to 3 m. between pits. The spacing given varies according to the intensity of shade and variety of cardamom planted. The pits are taken and covered with loose forest soil rich in fertility during May-June. Seedlings with at least 5 suckers or rhizomes with at least 3 bulbs are planted during July in each pit by forming a small depression in the filled up pits and setting the plant at an acute angle to the ground against the slope or keeping it in the erect position with supports. The base of the plant is then covered with a thin layer of soil and much of dried forest leaves No inter-cultural operation other than weeding thrice is undertaken during the first year. During the 2nd year in addition to the 3 rounds of weeding, basins of 75 cm radius are taken during October and November to prevent leaching of top forest soil and facilitating easy production of inflorescence. From 3rd year onwards shade regulation, weeding thrice, trashing once (removal of dried leaves and shoots) in May-June and harvesting are to be carried out. The flowering starts in April-May and continues even upto December-January. The crop will be ready for harvest in August-September. Six rounds of harvest can be undertaken with an interval of 30 days. Capsules are harvested just short of full ripeness.

The cardamom capsules are cured before they are marketed. Sun drying partially bleaches the capsules and therefore artificial drying is adopted so that the green colour is retained. Curing shed or smoke houses provided with furnace, wire net and flue pipes are

used for the purpose. The matured green capsules collected are spread over the wire net and are dried by a system of pipes running underneath, through which hot air from a furnace is passed. Trimming the ends of cardamom, storing, grading etc., have to be done before it is sent for marketing. Cured cardamom should be stored in double gunny bags in moist proof chamber to retain its quality. It is preferable to store it in wooden cells. On an average 100 kgs. of cured cardamom capsules will be obtained from a hectare of land.

Turmeric (Curcuma longa Linn) Manjal

The following is the description of this plant as given by Drury "According to Rumphius, the Javanese make an ointment with the pounded roots and rub it over their bodies as a preservation against cutaneous diseases. The root is considered a cordial and stomachic, and is prescribed by native doctors in diarrhoea. It is also an ingredient in curries. There is a wild sort which grows in Mysore; the natives consider turmeric in powder an excellent application for cleaning foul ulcers. The root in its fresh estate has rather an unpleasant smell, which goes off when it becomes dried; the colour is that of saffron and the taste bitter. Mixed with juice of the Nellikai, it is given in diabetes and jaundice. The juice of the fresh root is anthelmintic, and the burnt root mixed with Margosa oil applied to soreness in the nasal organs. The root is applied by the Hindoos to recent wounds, bruises, leechbites etc."

It is found to grow well in the humid tropical region of the State including tracts which are about 1,200 metres above mean sea level and also in comparatively hotter and drier regions of the plains. It is grown as a rain fed crop either pure or as an inter-crop in coconut plantations. Manuring of the land prior to planting is necessary. The mother rhizomes or 'bulbs' are invariably used for planting, cut longitudinally into two pieces, taking care to see that there is at least one sound "eye" on each piece. Planting is usually done in April to July. Different varieties of turmeric are not known, though differences in the appearance and quality of the produce are very marked. Harvesting commences in March and continues till the end of April. The Malabar variety is reputed to have better medicinal properties particularly for cold and catarrh.[2] The number of figures vary from ten to forty in a plant and the average yield per hectare ranges from 1,800 kg., to 2,100 kg., of cured turmeric. The fresh rhizomes have to be cured by boiling and dried for marketing. Before turmeric is exported, it is polished and coloured.

1 History of Kerala, K. P. Padmanabha Menon, Vol. IV, p. 409.

2 Spices Enquiry Committee Report, p. 83.

Arecanut (*Areca catachu* L)

Among condiments and spices, the arecanut or betelnut tree is the most important. Unlike other commercial crop, it occupies a special position in so far as its cultivation is essentially in the hands of poor farmers with small holdings generally not exceeding an acre in extent. It is grown in the same localities as the coconut and the process is almost the same. In the alluvial tracts it is grown in coconut plantations as a minor produce, while in the laterite regions extensive plots of lands are devoted exclusively to it.

The palm grows well in soils which can retain an optimum moisture and requires plenty of shade. Usually banks of rivers, valleys between hills, hill slopes and homesteads are planted with arecanut. It is a perennial crop. The palm has a tall, erect, unbranched stem, very graceful, often reaching a height of about 18 metres or even more. The seed may be sown either directly in the garden (in situ) or by raising seedlings and transplanting them after they have grown in the nursery for periods ranging from six months to two years. Transplanting is also popular. Usually the seeds are gathered from very old trees. The planting of the seedlings is done in the rainy months from June to September. The spacing adopted varies from place to place ranging from 1.8 m x 1.8 m. to 3.6 m. x 3.6 m. However, 1,200 to 1,650 trees are seen planted in a hectare. Arecanut requires more watering and manuring than the coconut palm. The practice of manuring is prevalent only in certain places. Wood ash, green leaves and cattledung are used. The arecanuts are harvested for the preparation of '*kalipak*'. The harvesting season starts from June and extends up to December. That for ripe nuts commences in October and extends up to March.

Cinnamon (Elavarngam) (Cinnamomum Zeylanicum Nees)

Asia's largest plantation of cinnamon, the famous 'Brown's Plantation', is situated at Anjarakandi near Tellicherry. Owned now by Mr. Carig Jones, it has an area of nearly 200 hectares. Cinnamon cultivation on a plantation basis is more than a century and a half old in Kerala. A plantation was started at Anjarakandi by the English East India Company in 1797. Spices like pepper, nutmeg, clove and cinnamon were cultivated here, but finally cinnamon alone flourished. The estate is giving considerable profits even now.

Cinnamon thrives best in alluvial sandy soils where the average annual rainfall is not less than 200 cms. Its cultivation is, therefore, concentrated mostly in the coastal region. The climate of the

tract in Anjarakandi is very humid, being only about 15 kms. from the coast and almost at sea level, with salt water in the river just below the plantation during summer. The soil is comparatively poor, laterite rather open in texture and with a fair admixture of sand. Prolonged spells of dry weather are not considered suitable for its successful culture. The variety that is grown at Anjarakandi is reported to have been obtained from Seychelles. It is considered as good as the Srilanka product, Srilank quality being considered superior to the Cinnamon produced in all other countries. Cinnamon tree is generally raised from seed. The seeds are sown either in a nursery and the seedlings later transplanted in the field, or in groups of four or five in situ in the field in sheltered situations. The usual time of transplantation is October-November. Weeding of the field is done two to four times a year. Good manuring is usually necessary and for this cow dung and oil cake are used. Harvesting takes place in the rainy season when the bark peels out readily. The first harvest from a three or four year old plant yields about 20 to 25 kg. of cinnamon quills. A ten year old adult tree gives 65 to 90 kg. The yield of the bark varies according to climatic conditions and the age of the plants. It diminishes to about 50 per cent after the first ten years.

Shoot borer, Metisor plana, red ants, termites etc., are some of the pests attacking this tree. The cultivation of this valuable plant may be expanded on a plantation scale in places where it can be grown successfully and a good quality bark obtained as in Anjarakandi. The demand for cinnamon in India is now largely met by imports and there is scope to make the country self-sufficient in this spice.

Lemongrass (Inchipullu)

Lemongrass oil is the volatile oil obtained by the distillation of the leaves and shoots of the aromatic grass *'cymbopogon flexuosus'*. One of the important essential oils produced in India, quantitatively it occupies the prime place among the essential oils exported from the country. The oil is valued for its main constituent 'citral' an aldehyde.

Lemongrass is a hardy plant which can withstand extreme weather conditions. It comes up well under a wide variety of soils ranging from rich loam to poor laterite. It is mostly cultivated in hill slopes as a purely rainfed crop. Swampy areas with poor drainage are not suited for its cultivation. Excessive fertility is also not conducive to the crop as it will induce only high vegetative growth at the expense of oil yield. The most ideal climate is offered by a

warm humid atmosphere with plenty of sunshine and a total rainfall of 250 cm. distributed evenly over the year. Lemongrass is a perennial crop and will remain for years together. The crop is propagated mostly by seeds. Propagation through seeds can be done either by raising a nursery and transplanting the seedlings or broadcasting the seeds directly in the main field. Transplanting seedlings is a better method. Lemongrass is not usually manured by cultivators but application of spent lemongrass compost (grass thrown out after distillation) at the rate of about 1,200 kg. per acre in combination with wood ash at the rate of about 750 kg. per acre serves as a good manure to the crop. Weeding and earthing up are the important inter-cultural operations. Weeding must be done regularly and earthing up of the crop once in an year. The crop is not normally affected by major pests and diseases.

During the year of planting the first harvest is taken when the crop is about 3 months old after transplantation and subsequent harvests at intervals of 50 days. This interval will be greatly influenced by the soil fertility, climatic factors etc. Harvesting is done by women by cutting the grass about 10 cm. above ground level with sickles and it is tied into small bundles weighing about ¼ kg. This is then made into bigger bundles and carried to the distillation shed. During the 1st year, 2 or 3 cuttings and from subsequent years 4 or 5 cuttings will be done subject to weather conditions. About 10 tons of grass per hectare will be obtained during the 1st year and from the 2nd year onwards 15-20 tons of grass per hectare per year from a good plantation. The average percentage of recovery of oil is about 0.4 and the oil yield from an hectare will be about 35 kgs. of oil during the 1st year and about 60 to 70 kgs. from the 2nd year onwards. As far as possible harvesting is not done during rains.

Lemongrass can be distilled either by using steam under pressure injected from a boiler or by water and steam method by pouring water into the still and producing the steam inside. The still used for the purpose is made of copper with a capacity to hold about 70 to 80 kgs of grass. About 110 litres of water is first poured into the still and the still is heated from below. When the water is hot grass bundles are put into the still. When it is fully packed the still is closed steam tight. Steam from the boiling water enters the plant material which gets digested. The oil particles are liberated from the plant tissues and a mixture of oil vapour and steam escapes into the condenser where it gets condensed into oil and water and gets collected in the receiver. Oil being lighter floats at the top and condensed water escapes through the side tube. When the distillation from the condenser ceases to contain any traces of oil (this will be over in about 1.5 to 1.75 minutes from the time the distillate first falls) the distillation is stopped and

the spent grass is removed and fresh grass put again. For the next distillation only about 15 to 25 litres of water need be poured into the still since there will be some water inside. The oil floating in the receiver is skimmed off frequently with a copper spoon and poured into bottles. This oil is very crude and will contain dirt and sediments besides traces of water. The bottles containing oil are allowed to stand undisturbed for a day or two when all the sediments will settle down and the clear oil can be decanted.

The digested grass thrown out after distillation is a good by-product and valued much. This is used as a good manure to many crops like ginger, banana etc. The spent grass is also a good raw material for manufacture of printing paper by mixing its pulp with long fibred bamboo pulp. It is also said that spent lemongrass is a good fodder to cattle and can be used in place of paddy straw as a roughage by air drying. It can be fed by preparing silage also.

Lemongrass oil is packed in steel drums which have a capacity of 182 to 205 litres each. It is mainly exported to the United States of America and United Kingdom.

The major lemongrass growing areas in the State are the Districts of Wynad, Cannanore, Idukki, Kozhikode and Ernakulam. The area under the crop comes to about 7,000 hectares.

Chilly (Capsicum annum)—Mulaku

The area under chilly in the State is 1.269 hectares. Among the districts of Kerala Cannanore with 906 hectares had the largest area under this crop in 1981-82. From the point of view of production also it occupied the highest rank. As a condiment which enters into the preparation of curries it has become indispensable in every Kerala home. Chilly was introduced by the Portuguese about the 16th or 17th century. In recent times varieties from Palghat, South Canara and Guntur were tried at the Agricultural Research Station, Taliparamba and the promising varieties were multiplied and seedlings supplied to the ryots. The crop is grown mainly as a rainfed one while in some localities it is also grown as an irrigated crop. It responds well to manuring. Application of cattle manure and Ammonium Sulphate doubles the yield. Chilly seedlings are planted in October-November and harvested in January-April. It is highly susceptible to crop failures and attack by thrips.

Tobacco

Kasaragod is the only District in the State which grows tobacco on a commercial scale and as such the crop deserves special treatment. A narrow strip of sandy wasteland along the sea coast, lying between Kasaragod and Kanhangad, is the main centre of tobacco cultivation. Pannan is the most extensively used variety in the area. The tobacco grown in the District is of an inferior type and is used only for chewing and snuff-making. The cost of production of tobacco here has been always high when compared to other tobacco growing tracts in India. This is mainly attributed to the peculiarities and special conditions under which the crop is raised here. The soil is sandy and therefore, very poor, necessitating the application of huge doses of both organic and inorganic manures, the cost of which alone comes to the tune of Rs. 2,500 to 3,000 per hectare of tobacco.

The area under tobacco is 570 hectares. Tobacco cultivation is confined to the coastal area in Hosdurg and Kasaragod taluks where it is raised as a summer crop from November to February. After the harvest of tobacco in February the fields are left fallow till May when a paddy crop is raised. The paddy will be harvested in September and the fields are prepared again for tobacco to be planted in November. In short, tobacco is rotated with paddy for one season.

The tobacco produced in Kasaragod district is not relished for chewing by people in other parts of the State. Hence it is disposed of in the Mangalore market alone. The people in the suburbs of Mangalore, namely Udupi, Kundapur, Karkal etc., have a traditional preference for the tobacco of Kasaragod district. The market is not, however, steady and the merchants at Mangalore get the produce from the growing area through their middlemen or commission agents. There is a practice prevalent here among the growers to mix sand with tobacco during harvest time to get increased weights. Immediately after harvesting the plants are allowed to wilt in the field for a few hours, when fine sand is sprinkled over the leaves. Due to the gummy nature of the leaves, the sand particles stick on the leaves, thereby enhancing the ultimate weight of the cured tobacco. This is more or less an act of adulteration obviously done to increase the yield per acre. But the tobacco traders in Mangalore or the actual consumers do not seem to object to this practice.

PLANTATION CROPS

Rubber (Hevea brasilliensis)

Hevea brasilliensis is commercially the most important source of natural rubber. It was brought from Brazil (in the Amazon valley) and introduced into tropical Asia in 1876, through Kew, with the seeds brought from Brazil by Sir Henry Wickham. From the original plantings in Ceylon, the cultivation of rubber spread in later years to Kerala. Until the end of the 19th century rubber cultivation in the State had been little more than experimental. It was not till 1902 that the Periyar Estate at Thattakkad was opened and within the next fifteen years a considerable portion of the present rubber yielding area in the district was planted.

While Kerala holds almost complete monopoly in the sphere of rubber production in India, the Kottayam district has the largest concentration of rubber acreage of India. The area under rubber in the State is 3.10 lakh hectares. The main rubber producing areas of the State are Kottayam, Pathanamthitta, Ernakulam and Wynad. Soil, climate and other natural conditions in the State are well suited to the growth of rubber plants. During the last decade or two there has been a sharp increase in the area under rubber. This is a proof of the growing popularity of rubber cultivation in the State. Increase has also been registered in the tapped area. The production also keeps pace with the area, the State contributing 1.72 lakh tonnes out of the total of 1.87 lakh tonnes in the whole of India constituting more than 90%.

Rubber is a sturdy, quick-growing, tall tree, thriving with a wide tolerance in any moderately good, deep, loamy soil. It is generally cultivated at elevations about 300 metres. A warm humid equable climate (21° to 35°C) and a fairly distributed annual rainfall of not less than 200 cm. are necessary. Rubber tree is propagated from the seed as well as vegetatively. In Kerala seed of Hevea (Rubber tree) normally ripens in July-September and for raising seedlings, they are gathered during these months. Plants raised from seeds are called seedlings. Seeds collected from unselected seedling trees are called ordinary seeds and the seedlings raised from them are called ordinary or unselected seedlings. Earlier plantations in the Far East were raised from unselected seeds. Hence the yield was low in many of the

plantations. In the mean time selection on Hevea with a view to improving the quality of planting materials led to the discovery of numerous valuable clones and seedling families. A seed when collected from a clone (budgrafted tree) is called clonal seed. A clonal seed of known parents (where both male and female parents are known as in the case of hand pollinated seedlings) is called a legitimate seed. It has been proved beyond doubt that good clonal seedlings are far superior as a planting material than ordinary seedlings. But all clones are not recognised as good seed parents. The seed of TJIR I has proved a reliable seedling family in trials and good seedling families have been obtained in Malaya and Java when TJIR I is crossed with the majority of high-yielding clones. Rubber seeds retain viability only for a short period. Hence they should be sown immediately after receipt to get the maximum germination percentage. The sooner the seeds are planted, the better will be the germination. The germinated seeds must be carefully handled during planting. They should be removed for planting out at an early stage, before the roots are more than one inch long.

Germination beds should be prepared sometime in advance of the date when seeds are expected so that the seeds may be planted in a suitable germination medium immediately after their arrival. Germination beds should be situated on a level site and may be divided off into units of convenient size and shape. The best germination medium is pure, fine grained river sand. The beds may be raised 12-15 cms. above the general soil surface so that surplus water may drain freely. It is necessary to provide an artificial shade, supported above the germination beds, so that at no time the beds are exposed to strong direct sunlight. The seeds should be planted horizontally in a single layer. They may be set touching one another and should be firmly pressed into the bed with the flat grooved side downwards. The upper surface of the seed must just be visible above the surface of the germination medium. The germination medium should be kept in a moist but not wet state by sprinkling evenly with water in the early morning and later evening. Too dry conditions or too wet conditions are equally undesirable. Seeds start germinating within 6 to 7 days of their being planted in the germination beds. Each day seeds showing growth of the young root should be removed for planting. Chances of establishment are enhanced by planting out the seed before the young root

is two cms. long and before the young shoot starts to develop, At this stage the seed has sufficient moisture and food reserve for the root to penetrate deeply and secure moisture. Delay in transplanting also increases the chances of damage to root and shoot which may result in forking of the root system and growth of double shoots.

The operation of budgrafting consists in inserting a strip of bark containing a bud under the bark of a young seedling tree. When the tissues of the budpatch and the seedling have become firmly united—3 to 4 weeks after budgrafting—the seedling stem is sawn off above the grafted bud and this bud then grows out to form the new tree which produces the properties of the budgrafted tree from which it was taken. In Kerala budding is best done during the months of April-May, but it can be successfully carried out during other months also if the weather is not too dry or too wet. Budgrafting on seedling stocks is done usually when the stock is one year old or even two years old. The new technique under development is to bud seedlings of two to eight months old using buds stripped from green terminal shoots. These green buddings are raised in polythene bags in nurseries and transplanted with shoot and root system undisturbed. The advantage claimed of it is that the maturity period can be reduced.

Most of the rubber plantations are situated on low hills or hillocks of varying sizes and heights. Flat lands lend themselves easy for working but the extent of such areas suitable for growing good rubber provided adequate measures are taken to conserve the soil and the altitude does not exceed about 300 metres is limited. The operations for new rubber planting consist of felling and clearing, contour terracing on slopes, laying of roads and pathways, provisions of drainage facilities, etc.

The planting distances are generally selected in such a way as to provide more or less 450 pits per hectare in the case of buddings and 500 or more pits in the case of clonal seedlings. Some of the common distances adopted to give such a stand per acre are:

(a) for buddings in hilly	6.70 x 3.35 metres.
areas in flat areas square	4.87 x 4.87 ,,
(b) for seedlings in hilly	6 x 3 ,,
areas.	9 x 9 ,,
In flat areas	4.27 x 4.27 ,,
	4.57 x 4.57 ,,

Spacing of more than 9 metres between rows and less than 2.44 mtrs. between plants in the row are not generally favoured. When the rows are widely apart it is termed as hedge planting.

Planting holes provide the young plants with good soil conditions for establishment and quick growth. It is particularly important that the shape and size of the pits should be made in such a way as to satisfy the primary needs of the young plant for establishment at the initial stage. Pits are usually dug to the size of 91 cms. x 91 cms. But 76 cms. x 76 cms. x 76 cms. may be sufficient. Alterations from this standard size may be made depending on the type of planting materials used and the nature of soil available. For example a stumped budding would need a larger and deeper hole while germinated seeds or basket plants need comparatively smaller holes. Similarly when the soil is hard the pit has to be widened. For purpose of economy, in the better types of soil, pits are sometimes dug wider at the top and tapering to the bottom or the depth reduced to about 61 cms. with central "alavango" hole 15 cms. or more in depth for the tap root. Holing can commence as soon as the work of clearing is sufficiently advanced and it is important that filling should be completed sometime before planting to give the soil sufficient time to settle. When digging the hole, the top soil should be placed on one side and remainder top soil as far as possible. Sufficient surface soil has to be collected away from the hole for this purpose, all stones and roots removed and this soil should be used for filling the pits. When manure is to be applied it should be thoroughly mixed in the top twenty cms. of the soil in the hole. The hole should be filled to about five centimetres above ground level.

The soils in rubber growing areas are mainly laterite. They are poor in available phosphoric acid, potash and other bases and acidic in reaction. The myth of very fertile virgin soils has been denounced by modern science. Therefore, it is essential that rubber should be regularly manured from the time of planting to the age of economic production. Manuring increases the yield of latex substantially and keeps the tree in vigour. Fertiliser application to the young rubber, during the pre-tapping stage, is for accelerating the growth. Regular application of 8:12:12 NPK fertiliser mixture is recommended detailed in the schedule given below. The dose of 910 gm. per planting point twice in a year may be continued till the area is put under tapping.

Tea:

Tea is the foremost among the exports of Kerala and the second important cash crop of the State in terms of net value contributed. It also employs the largest number of persons among the plantation crops. In 1983-84 total area under tea in the State was 35,021 hectares. The production was 44,582 tonnes out of 581,484 tonnes of tea in India. The main tea producing areas are Idukki District constituting about 24,000 hectares.

Tea is usually cultivated at altitudes ranging from 914 metres to 1,525 metres above mean sea level. It thrives well in light friable soil of good depth through which water percolates freely. After removing the forest growth planting is done. The actual spacing of the plants will depend on the lay-out of the land. They are usually planted in square, rectangular, or triangular pattern. Usually 7,500 plants are planted in an hectare. "Hedge Planting" (Planting in rows 152 cms. apart with a spacing of 61 cms. between the bushes in a row) is also done in new estates. Planting will begin in June or July. When the plants are about two years old and 1.8 metres high they are pruned to stimulate lateral growth and to develop them into a bush. Plucking is usually done by women and children. The young and freshly sprouted leaves with "two leaves and a bud" are plucked. Plucking is done throughout the year in various rounds. The average yield of a good estate is about 453.592 kgs. of prepared tea per 0.40 hectare.

A host of operations have to be performed to produce the conditions in which plucking of tea can be efficiently and profitably carried out. Among these are weeding, pruning, replacement of unproductive bushes, application of artificial manure, upkeep of shade and shelter trees, treatment and eradication of plant diseases, control of pests and blights, provision and maintenance of drains and boundaries, spraying and dusting. To produce the maximum crop, all these operations have to be carried out correctly and at the right time. As in all forms of agriculture, there are no easy formulas, and each problem has to be solved by the technical knowledge and understanding of the tea bush that comes from years of experience. Also like all forms of agriculture, tea planting is at all times a gamble with the weather. A prolonged drought at the beginning of the year, delay or paucity of March rains, a south-west monsoon that is longer

or shorter than usual, temperatures very much below average, an unusual number of cloudy days—any of these is sufficient to spoil either of the rushes, as the two main cropping periods in April-May and September-October are known, and thus affect the whole year's crop.

In spite of the basic similarities with other forms of agriculture, the tea estates are set apart by their unique form of organisation. By organisation into estates, the economics of optimum size, the advantages of professional management and supervision, and the benefits of centralised research, technical, medical, legal, financial and other services are obtained. All these result in greater production and productivity than would otherwise be obtainable, which in turn lead to higher foreign exchange earnings, greater employment and higher revenues for the State—all of undoubted advantages to the national economy.

Coffee (Coffea arabica and Coffea robusta)

Coffee is believed to have been brought to India over two centuries ago by a Muslim Pilgrim named Bababudan[1]. The cultivation of the coffee plant was introduced by Mr. Murdock Brown in his plantation at Anjarakandi in Wynad at the end of the 18th century. The venture prospered and gradually estates sprang up all over the then Wynad Taluk. The first serious check to the industry was given by the borer, *Xylotrechus quadrupes,* which in 1865 destroyed whole estates. Soon after a remedy for its ravages had been found, the fungus *Hemelieia Vastarix* made its appearance and by 1875 had devastated the whole crop. There has been some improvement since, and coffee is still the staple product of Wynad Plantations even though the present position is that it pays only on the most favourably situated estates and only with most careful cultivation.

In 1983-84 the total area of coffee in the State was 64,009 hectares. Coffee is a tropical plant. Several species of it are known but only two are popularly grown viz. *Coffea arabica* and *Coffea robusta*. *Coffea arabica* was the earliest introduction and produces a superior quality beverage, though susceptible to diseases. "Its foliage resembles that of the Portuguese laurel; the small white blossom is not unlike that of the jessamine in form and scent; the berries are at

[1] Memoirs of the Department of Agriculture, Madras, p. 841.

first dark green, changing as they mature to yellow red and finally deep crimson. Beneath the skin of the ripe berry, or 'cherry' as it is called, is a mucilaginous, saccharine, glutinous pulp, closely enveloping the 'beans'..................these beans are coated with a cartilagineous membrane known as 'parchment', and beneath this by a very delicate semi-transparent jacket, termed the silverskin"[1]. *Coffea robusta* is a more recent introduction and is sturdier and more vigorous. It has more powers of resistance against extremes of climate, and pests and diseases.

Coffee cultivation is mainly confined to 3 southern States, Karnataka, Kerala and Tamil Nadu. Kerala accounts for nearly 25% of the area under coffee in India. The total area under this crop being 62,368 hectares in 1982-83. Coffee is generally cultivated in high altitudes ranging from 300 to 2,000 metres above mean sea level. The most suitable altitude is between 600 and 1,400 metres. The plant needs a well distributed rainfall of about 150 cms. to 200 cms. per annum and a distinct rainy and dry season with a minimum average temperature of 23°C[2]. Coffee requires sandy soils or clay loam with a good sub-soil drainage system. It is usually grown from seed. It is also propagated from cuttings from mature trees or shoots. Propagation from seeds is usually done in January or February in well prepared nursery beds. When the plants are twenty inches in height they are finally transplanted. The spacing between each plot is ordinarily 2.5 to 3.1 metres. The plots are manured well and watered frequently. In the second method of propagation, lower branches of the trees are bent down under the earth for at least four months so as to enable new roots to sprout up from these branches. Shade trees are provided in coffee plantations for protection of the trees from the full blast of the sun and for soil conservation. Usually the coffee plants are pruned at a height of 4.5 mtrs. to enable easy plucking of the berries. Coffee plants begin to bear fruit within 5 to 7 years of planting. The colour of the berries is green at first. It slowly changes to golden and then to bright red. These red cherries are plucked up by hand. Several plucking are necessary before a crop is completely harvested. Under good climatic conditions a

1 Malabar District Gazetteer, Innes, p. 225.

2 Report of the Plantation Enquiry Commission, 1956, Government of India, p. 5.

coffee plant yields ½ to 1 kg. of green coffee in a season. Good yields may be obtained from a plant for a period of 20 to 30 years. Excessive rains or want of rains in the blossoming season will adversely affect the yield. Foreign buyers of coffee are mainly European countries of which Germany and Italy are important. The Soviet Union is a new entrant in the field.

FRUITS AND VEGETABLES

Though small in size, Kerala has about 3.5 lakh hectares under fruit crops, which could be the largest horticultural area found in any State in India. The entire country side is dotted with groves of mango, jack, banana and pineapple. Almost every house has a few mango or jack trees, and there is not a village which does not grow plantains. Besides, cucumber, pumpkin, bitter gourd, snake gourd, brinjal, water-melon, chillies, and other vegetables are grown in abundance in almost all parts of the State.

Mango

Mango *(Mangifera indica)* is the fruit *par excellence* of India. The English word is derived through the Portuguese who called it by the Malayalam term "Manga". Owing to its high adaptability to different kinds of soils, the cheapness of its culture, its high yields, and extremely delicious table qualities, it has been cultivated extensively in the State from time immemorial. It is an evergreen tree blossoming from January to April according to situation, the fruit ripening from May to July. There are many varieties. Some of them are good for curries and pickles while others are excellent as fruits. The mango tree is best propagated by grafting, though it readily grows from seeds. The wood of the mango tree is used as fuel for building canoes and sometimes for houses and furniture.

It would be better to turn to Drury's *"Useful Plants"* to have a correct idea of the mango tree and its uses. "The Mango is well known as the most delicious of Indian fruits. It is esteemed very wholesome and when unripe is much used in tarts, preserves, pickles, etc. There are many varieties all more or less having a peculiar turpentine flavour, though the best kinds are generally free from it. The kernels of the nut seemingly contain much nourishment, but are only used in times

of scarcity, and famine, when they are boiled and eaten by the poorer classes. In the pulp of the fruit, there is sugar, gum, and citric acid; gallic acid has also been procured from the seed, and also stearic acid. Interesting experiments were made sometime ago, by a French Chemist, upon the process of procuring the gallic acid, which he stated might be used in the preparation of ink instead of galls. Whenever the fruit is cut with a knife a blue stain is seen on the blade which is due to the presence of gallic acid. The timber is soft of a dull grey colour, porous, soon decaying if exposed to wet, but useful for common purposes. In large old trees the wood acquires a light chocolate colour towards the centre of the trunk and larger branches and is then hard, close grained and somewhat durable. The wood burnt with sandal wood, is one of those used by the Hindus, for burning corpses, and is reckoned sacred for this purpose"[1]. The area under mangoes in the State in 1984-85 came to 60,000 hectares.

Mangoes, both raw and ripe, are consumed in large quantities. The raw fruits are salted, pickled, cooked and used in numerous culinary preparations. Among the grafted varieties the most important are Pairi, Alphonso, Neelum, Bangalora, Bennet Alphonso, Kallapady, Imam Pasand, Jehangir, Allumpur Baneshan, Mulgoa, Mundappa, and Prior.

Pairi is the leading commercial variety of Palghat area. The tree is of large size and spreads out freely. The fruit is soft and fleshy with a good flavour and sweet taste. Next in importance is the Alphonso which is very delicious and has a fine flavour. The Neelum is medium-sized and fibreless with a sweet taste. The tree often bears two crops annually. Bangalora is a large sized fruit with a prominent beak. The Bennet Alphonso is most abundant in Malabar area. The fruits are rather small with a characteristic reddish tinge and ripen earliest in the mango season. The Kallapady is one of the sweetest varieties with a good keeping quality. It enjoys great popularity and is grown both in house and commercial gardens. The Imam Pasand is one of the largest mangoes, very sweet and of good keeping quality. The Jehangir is prized for its excellent taste and flavour. The Allumpur Baneshan and the Mulgoa are choice varieties and sell at a premium. The Khudadad is fast gaining in popularity as a commercial variety, particularly in Palghat area. The Olour,

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[1] History of Kerala, Vol. IV, K. P. Padmanabha Menon, pp 444-445.

one of the earliest to fruit in the country is a heavy bearing variety of Kozhikode district. It goes even to the distant markets of North India mainly because of its early appearance. The Mundappa which originated from South Kanara district is grown mostly in Malabar area. It is a juicy and fibreless variety. The Prior is a commercial variety of Trichur with a long fruiting period of nearly 2½ months. Its cultivation is now spreading to other parts of the State also.

Jack Tree

One of the medieval travellers, John de' Marignolli gives the following description about the jack tree. "There is again another wonderful tree called *Chake-Baruke*, as big as an oak. Its fruit is produced from the trunk, and not from the branches, and is something marvellous to see, being as big as a great lamb, or a child of three years old. It had a hard rind like that of our pinecones, so that you have to cut it open with a hatchet; inside it has a pulp of surpassing flavour, with the sweetness of honey, and of the best Italian melon; and this also contains some 500 chestnuts of like flavour, which are capital eating when roasted"[1]. Rheede in his *Hortus Malabaricus* says, "Of this tree, however, they reckon more than 30 varieties, distinguished by the quality of their fruit, but all may be reduced to two kinds; the fruit of one kind distinguished by plump and succulent pulp of delicious honey flavour being the *Varaka;* that of the other, filled with softer and more flabbly pulp of inferior flavour, being the Tsjakapa"[2].

Jack covered an area of 58,000 hectares in the State in 1984-85. Jack fruit serves as a subsidiary staple food in many parts of Kerala. Large-sized and tasty it is put to many uses. Individual fruits may weigh as much as 25 kg. or more.

Like the mango, four or five or even more jack trees are found growing in almost every house compound. In Malayalam the fruit is called *chakka* and the tree *pilavu.*

Jack tree flourishes best in clayey and laterite soils. An average tree begins to bear fruit in its eighth year and yields 20 to 30 or even more fruits annually. The fruit is of enormous

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1 History of Kerala, Vol. IV, K. P. Padmanabha Menon, pp. 438 439.

2 History of Kerala, Vol. IV, K. P. Padmanabha Menon, pp. 439-440

size. Inside it there are some 250 to 300 pippins as large as figs which are very sweet in taste. Sometimes the fruit is also found growing from the exposed basal roots of the tree and these fruits excel the others in flavour and taste. The timber of the tree, the well known jack-wood, is valued for making furniture and musical instruments.

Banana[1] (Musa Paradisiaca Linn and Musa Sapientum)

This fruit called in ancient Sanskrit Literature the fruit of the wise men is grown in plenty everywhere in the State. In 1984-85 the State had 16123 hectares under this crop. Besides every house garden has a few plantains in it. Besides the perennial varieties like *palayankodan, kannan, padatti, poovan, kadali, chingan* etc., which are grown in the compounds attached to houses and farmyards, the *nendran* variety is grown on a large scale in both wet and dry land areas. Almost all kinds of soils in the district are suited for plantain cultivation but an admixture of sand and clay is the best. The ground is at first hedged in to prevent cattle from straying in. It is then ploughed and furrowed. Where the ground is uneven, terraces are formed. Where it is not fit for ploughing, spade work is done. Pits are dug and half the depth is filled with dry leaves, rubbish and ashes. The shoots or suckers are then planted and the pits covered with manure. There is no particular planting season. They are planted in all months in the fields. The *nendran* variety is largely grown in dry land areas from Thulam (October-November) to Dhanu (December to January). If well manured the bunches can be gathered by the Onam season in Chingam (August-September). The number of fruits in a bunch vary according to variety. In the case of the bigger fruits fifty is the average while the number ranges from 200 to 300 and more in the case of *palayankodan*. A bunch of the *nendran* variety contains thirty to sixty fruits arranged in clusters. The plant is used in a variety of ways. The unripe

1 Banana, bonana as originally spelt, is the West Indian name for Musa. It is now commonly applied to all table varieties in the Western countries; but on the Malabar coast, the banana is applied to Nendran, the variety commonly known in the Western countries as plantain. The term plantain is popularly attributed by Westerners to varieties with persistent withered bracts and staminate flowers, large fruits of a foot in length which are laxily held on the bunch and usually cooked and eaten; in India, term plantain is applied to the banana of the Westerners.

fruits are cooked and eaten. They are also cut into thin slices, fried in coconut oil and sometimes coated with jaggery and sugar. These preparations locally called *upperi*, *sarkara upperi* etc., are very much liked by the people. Plantain meal is considered more digestive and strengthening than that of arrow root and hence more suitable for children and invalids. Besides plantains the extremities of the flower shoots and the core of the stem are also used in curries. There is hardly any marriage or other auspicious occasion in which the plantain tree with bunches does not grace the festival *pandal* as appropriate emblems of plenty and fertility. Its popularity as a decorative plant is evident from its inclusion in the design of the paper currency of India. The stem yields a fine white silky fibre which is used in weaving.

Pineapple (*Ananas Sativus*)

The Pineapple is believed to have been first introduced by the Portuguese in the State. Its cultivation now extends to almost all parts of the State as it can be grown even sphere irrigation facilities are not available. The area under Pineapple in the State in 1984-85 was 4800 hectares.

Pineapple is a humid tropical fruit renowned all over the world for its good taste. It is capable of producing heavy yields and can be grown in the alleys of other widely spaced fruit crops. Where the temperature is high it is desirable to grow this crop in the shade of tall trees as in coconut or mango orchards. Pineapple prefers a well drained soil of open texture with irrigation facilities. It thrives with less care on the hill slopes than on plains. The crop is usually propagated by basal suckers. Slips that arise below the "apple" and crown and the crown slips that arise around the crown are also used. The plants yield in 12 to 18 months of planting suckers. They may yield two or three more crops on the same site after which they decline in yield and should be replaced. Pineapple is a good source of Vitamin A and C and contains a fairly large amount of iron. Canned pineapples are the most popular tinned fruits in the country. Being

largely suited to the canning industry, the pineapple is a very valuable crop which deserves to be cultivated on a larger scale. Large quantities of the fruit are exported from the State.

Cashewnut (Anacardium Occidental Linn)

Cashewnut is the most important of the dried fruits. A native of Tropical America it was introduced in Kerala by the Portuguese more than 450 years ago with a view to checking soil erosion. The cultivation of the crop has since gained great commercial importance. The area under cashewnuts occupied 1.37 lakh hectares in the State in 1984-85. The cashew tree is grown primarily for its fruits which are known as cashewnuts. The cashewnuts are processed to obtain the oil and inner kernels which have great commercial value. The cashew apple, gum from the bark of the tree and timber are also products of this tree which are useful to man. The cashew tree thrives on any soil. It is drought resistant. It is met with practically in all parts of the State, though in recent years the area under cashew has shown a diminishing trend owing to the emergence of rubber as a major crop. The cultivation of the cashew tree depends on seasonal rains, and a regular monsoon therefore becomes an essential condition for the successful cultivation of the crop. At present, no systematic method is adopted for cashew cultivation. The tree is grown in gardens and home-compounds interspersed with mangoes, coconuts and arecanuts. Invariably it is grown in the corners of numerous house-compounds and outlying areas which are considered as unsuitable for the growing of any other crop. The cultivation is simple and does not require any elaborate preparatory, or after-cultivation operation. The tree generally begins to bear fruits three or four years after planting. Full bearing will commence from the eighth to the tenth year and will continue for another 20 years before decline sets in. The annual average yield of a tree in full bearing has been computed at 10 kgs. The rawnuts are converted into kernels and exported. A detailed account of the cashew industry in the State can be had from Chapter V.

Oranges (Citrus Cinensis)

The loose jacket orange is of recent introduction. Orange came to be cultivated in the Wynad area following the growing awareness on the part of the consumers as well as growers of the importance of citrus fruits, but in recent years the area under oranges is reported to have decreased considerably. The exact area under the crop is, however, not known. The orange has been found thriving successfully in cooler regions with slightly higher elevations such as the Wynad hills. It is grown mainly in Thirunelli village mixed with coffee. The effect of atmosphere on the sweet orange is reflected in the taste and appearance of the fruit. In Wynad the fruits are insipid, though juicy. The oranges produced at Wynad are brought to the market and consumed locally. Calicut and Tellicherry are particularly important as marketing centres for oranges.

Water Melon (Citrullus Vulgaris)

Water melon is an important fruit grown in the river beds and gardenlands of the Cannanore district, particularly in the Edakkad Block area. It is an annual fruit growing in the dry part of the year from December to June. The period from December to February is the most suitable season for sowing. The water melon fruits take about three to four months to mature. Each vine yields three to five fruits. Tellicherry is an important marketing centre for water melon and the fruit is much sought after by the people in summer months.

Changes in the area under different crops

There has been some growth in agriculture, but it has not kept pace with the growth of the population over the last two decades. The net area sown rose from 19.24 lakh hectares in 1960-61 to 21.80 lakh hectares in 1980-81 (13.3%). and the gross cropped area rose from 23.49 lakh hectares in 1960-61 to 28.85 lakh hectares in 1980-81 (23%). This was mostly due to an increase in the cropping intensity from 1.22 to 1.32 over

the period. While there was an increase in the stock of land put to non-agricultural uses during this period, the area under permanent pastures and other grazing lands, land under miscellaneous tree crops, cultivable waste, fallow other than current fallow etc., fell substantially through this period (Table 1).

TABLE 1

Land Use Pattern in Kerala

(Area in '000 ha.)

	Land Use	1960-61	1970-71	1980-81*
1.	Total Geographical Area accordng to village papers	3,858	3,858	3,885
2.	Forests	1,056	1,055	1,081
3.	Land put to Non-Agricultural uses	205	275	270
4.	Barrren and Uncultivable Waste	151	72	86
5.	Permanent Pastures and other Grazing Land	45	28	5
6.	Land Under Miscellaneous Tree Crops	204	132	64
7.	Cultivable Waste Land	144	80	129
8.	Fallow Land other than Current Fallow	62	23	27
9.	Current Fallow	67	24	43
10.	Net Area Sown	1,924	2,172	2,180
11.	Total Cropped Area	2,349	2,933	2,885
12.	Area Sown More than Once	425	761	705

* Figures based on TRS.

Source: Directorate of Economics & Statistics, Kerala.

Area under Crops

During the last two decades area under most of the crops increased. Area under rice which had increased from 7.8 lakh hectares (1960-61) to 8.7 lakh hectares (1970-71) declined to 8.0 lakh hectares by 1980-81. The area under Pulses declined from 44 thousand hectares (1960-61) to 34 thousand hectares (1980-81). The area under Oil Seed (Sesamum) increased from 1960-61 to 1980-81. Among the annual crops, area under Tapioca increased from 2.4 lakh hectares in 1960-61 to 2.9 lakh hectares in 1970-71, but again declined to 2.4 lakh hectares in 1980-81. The area under Banana and other plantains registered progressive increase. Perennial crops in general have registered substantial increase in area. Area under coconut went up from 5.0 lakh hectares in 1960-61 to 7.2 lakh hectares in 1970-71 but declined to 6.5 lakh hectares in 1980-81. Area under pepper went up from 99 thousand hectares in 1960-61 to 117 thousand hectares in 1970-71 but again fell down to 108 thousand hectares in 1980-81. The area under Cashew went up progressively from 54 thousand hectares in 1960-61 to 141 thousand hectares in 1980-81. The area under Cardamom doubled during this period. In the plantation sector, the area under Tea has been more or less the same, while the area under Rubber almost doubled and the area under Coffee went up by more than three times during this period.

Production and Productivity

Production of important crops with the exception of coconut has increased in varying degrees during the last two decades. Steady or spectacular increase in production was noticed only in some plantation crops.

Annual production of rice in the State increased from 10.67 lakh tonnes in 1960-61 to 12.72 lakh tonnes in 1980-81. though the all time high level of production viz., 13.31 lakh tonnes was in 1975-76. The annual production of tapioca went up from 16.83 lakh tonnes in 1960-61 to 40.60 lakh tonnes in 1980-81 an increase of 241% even though the increase in area was marginal. This spectacular increase in the total production of tapioca was mainly due to an increase in productivity from 6.9 tonnes/ha. to 16.58 tonnes/ha. Production of pulses increased from 17.55 thousand tonnes (1960-61) to 22.48 thousand tonnes (1980-81).

The most important cash crop of the common man in Kerala viz., coconut, provides a dismal picture. The total

production of coconut declined from 3,220 million nuts in 1960-61 to 3,008 million nuts in 1980-81. The productivity of coconut declined steeply from 6,430 nuts|ha. in 1960-61 to 4,618 nuts|ha. in 1980-81. Incidentally in the year 1955-56 the productivity of coconut was 6,919 nuts|ha.

Production of pepper, another important cash crop marginally increased during this period though its productivity declined. The production of Cardamom—a major export—nearly trebled during this period, while that of cashew nuts declined. Tremendous increases in production were noticed in plantation crops like Tea, Coffee and Rubber. The production of Rubber in the State increased from 23.04 thousand tonnes (1960-61) to 140.33 thousand tonnes (1980-81) and Tea from 10.37 thousand tonnes (1960-61) to 50.72 thousand tonnes (1980-81).

Comparative statement of area, production and productivity of selected crops for the years 1970-71 and 1980-81 is furnished in Table 2.

TABLE 2

Comparative Statement showing area sown, production and productivity of various crops for the year 1970-71 and 1980-81, in Kerala

Items		*Unit*	1970-71	1980-81	% *Change*
(1)		(2)	(3)	(4)	(5)
1. **Area**:					
(a)	Net area sown	000 ha.	2,172	2,180	(+)0.37
(b)	Gross cropped area	,,	2,933	2,885	(—)1.61
(c)	Area under rice	,,	874.93	801.70	(—)8.37
(d)	Coconut	,,	719.11	651.37	(—)9.12
(e)	Tapioca	,,	293.55	211.99	(—)16.51
(f)	Tea	,,	37.59	36.16	(—)3.80
(g)	Coffee	,,	31.56	57.95	(+)83.62
(h)	Rubber	,,	179.26	237.77	(+)32.61
(i)	Cardamom	,,	17.19	51.01	(+)13.79
(j)	Pepper	,,	117.51	108.07	(—)8.06
(k)	Cashewnut	,,	102.71	141.28	(+)37.55
(l)	Arecanut	,,	85.82	61.21	(—)28.61

(1)		(2)	(3)	(4)	(5)
2.	Production				
(a)	Rice	000 tns.	1,298.01	1,271.96	(—)2.01
(b)	Coconut	Mln.Nuts	3,981	3,008	(—)24.44
(c)	Tapioca	000 tns.	1,617.19	1,060.91	(—)12.01
(d)	Tea	,,	41.45	50.71	(+)22.34
(e)	Coffee	,,	12.57	23.54	(+)34.76
(f)	Rubber	,,	78.73	140.33	(+)78.21
(g)	Cardamom	,,	1.25	3.24	(+)159.2
(h)	Pepper	,,	25.03	28.52	(+)13.91
(i)	Cashewnut	,,	115.24	81.90	(—)28.93
(j)	Arecanut	Mln. Nuts	12,738	10,805	(—)15.17
.	Productivity				
(a)	Rice	kg.ha.	1,484	1,587	(+)7.01
(b)	Coconut	No. of nuts ha.	5,536	1,618	(—)16.58
(c)	Tapioca	kg.ha.	15,729	16,576	(+)5.38
(d)	Tea	,,	1,103	1,402	(+)27.10
(e)	Coffee	,,	430	406	(—)5.58
(f)	Rubber	,,	139	590	(+)34.39
(g)	Cardamom	,,	26	60	(+)30.77
(h)	Pepper	,,	213	264	(+)23.94
(i)	Cashewnut	,,	1,122	580	(—)18.34
( )	Arecanut	No. of nuts ha.	148,130	176,431	(+)18.86

Source: Agricultural Statistics in Kerala 1975, Statistics for Planning 1977 of the Bureau of Economics and Statistics and Economic Review 1980-81.

Agricultural Implements

Buchanan has given sketches of the agricultural implements used in Kerala 160 years ago. The same type of implements without the slightest modifications are in use to-day

and for all we know, the same types were in use centuries before the Englishman's visit. Regarding the methods of cultivation prevailing in the district early in this century the *Malabar District Gazetteer* observes as follows[1]. "The Malabar ryot is a practical agriculturist whose methods are traditional and are not progressive. His implements are few in number and rude in construction, but they have the advantage of being light and cheap, and answer his purposes sufficiently well". The agricultural implements used at present include the local plough, spades of different pattern, rakes, and levelling planks. The chief tillage implement is the wooden plough. It consists of a tongue of wood fitted with an iron tooth, a stilt for holding, and a pole to be attached to the necks of bullocks or buffaloes. The plough is usually worked by one man and a pair of bullocks. It makes 'V' shaped furrows leaving ridges of unploughed land.

Improved type of implements such as M. B. ploughs and inter-cultivators are being popularised through the N. E. S. Blocks. The inter-cultivators are largely used in fields where the Japanese method of paddy cultivation is practised. It may be interesting in this connection to quote what the report of the "Techno-Economic Survey of Kerala" has to say on the subject "Agricultural implements in use in the state are antiquated and inefficient. The wooden plough continues to be the master implement and is used for tillage operations of almost all the crops. Iron ploughs and other tillage implements are not popular. The slow adoption of improved implement is mostly due to non-availability of implements and machinery suited to local conditions as well as due to their high cost. The topographical conditions and techniques of cultivation are unique in Kerala and there are no implements designed and developed to suit such conditions. There is, therefore, need for developing efficient implements for rice cultivation, plantation crops, soil conservation work and also for specialised implements such as ridgers and earthers for ginger and tapioca".

V. Mechanisation

Tractors and Tillers

Tractors and tillers are becoming common. It has been proved beyond doubt that by adopting tractor device, the farmer is gaining at least 50 per cent of the cost of preliminary

[1] Malabar District Gazetteer, Innes and Evans, p. 209.

operations if not more. Tractors if used, can avoid delay in ploughing and save a lot of human labour. The ploughing by tractor is deeper than that of a country plough and make available more foot area for the crop. This also reduces the weed growth in the field and thereby reduces the cost of cultivation. Tractors and tillers are now extensively used for ploughing. In the State agricultural labourers agitate against the large scale use of tractors.

Mould board ploughs, inter-cultivators, sprayers and dusters and paddy threshers have not yet obtained enough popularity. With the adoption of the cultivation with tractors many of the improved implements are also used by the farmer. The main draw back is that enough tractors are not available to the cultivators at the time of the preparation of land.

I. LIST OF AGRICULTURAL IMPLEMENTS

Sl. No.	*District*	*Agricultural Implements used*
1	Trivandrum	1. Plough, 2. Maram, 3. Spade.
2	Quilon	1. Plough, 2. Levelling Board, 3. Rake, Harrow.
3	Alleppey	1. Kalappa (wooden plough), 2. Maram or Gnavari Palaka, 3. Mammati or Palaka, 4. Hand Hoe, 5. Sickle.
		Popular Irrigation devices peculiar to Alleppey
		1. Pikola, 2. Baling spoon and Baling Basket, 3. Water wheel, 4. Water pump or steam pump, tractor.
4	Kottayam	1. Plough, 2. Spade, 3. Hoe, 4. Sickle
5	Ernakulam	1. Kalappa, 2. Palaka, 3. Spade.
6	Trichur	1. Plough, 2. Maram, 3. Spade.
7	Palghat	1. Plough, 2. Spade, 3. Levelling plank, 4. Wooden Mallet, 5. Iron Plough, 6. Weeder, 7. Sickle, 8. Felling knife, 9. Tractors & Tillers.
8	Kozhikode	1. Plough, 2. Maram, 3. Spade.
9	Cannanore	1. Plough (Kalappa or kari), 2. Levelling Board (Palaka), 3. Mammatti (Kaikot)

II. The number of agricultural implements and machinery in the State in 1982 is given below.*

Agricultural Implements and Machinery

Item	No.
1. *Hand operated implements:*	
1. Seed fertilizer drill	15,920
2. Seed drill	1,753
3. Chaff cutter	4,031
4. Wheel hoe	5,164
5. Sprayers	35,206
2. *Animal operated implements:*	
1. Duster	9,501
2. Wooden plough	228,566
3. Steel ploughs:	13,861
(a) Soil stirring	33,524
(b) Soil turning	13,861
4. Disc harrow	764
5. Cultivator Trihali	993
6. Seed cum fertilizer drill	281
7. Seed drill	3,186
8. Levelling karah (leveller)	100,049
9. Wetland puddler	8,085
10. Ol pad thresher	1,283
11. Animal cart	8,245
12. Persian wheel	309
13. Sugar-cane crusher	95
3. *Plant protection equipments and engines etc.:*	
1. Power operated sprayer|duster	2,058
2. Diesel engine pumpset	24,475
3. Electric pumpset	74,456
4. Power tiller for agricultural purposes	3,925
5. Tractor for agricultural purposes	1,335

Source: Livestock Census 1982.

	Item	*No.*
6.	Mould board plough	1,278
7.	Disc harrow	84
8.	Seed drill	23
9.	Seed cum fertilizer drill	27
10.	Plant feller	188
11.	Leveller	3,582
12.	Potato digger	207
13.	Trailer	297
4.	*Combined harvester:*	
1.	Tractor attached	60
2.	Self propelled	8
3.	Wheat Thresher	20
4.	Paddy Thresher	330
5.	*Other power operated equipments:*	
1.	Multi crop	33
2.	Maizer sheller	4
3.	Chaff cutter	17
4.	Sugar-cane crusher	71

(VI) Seeds and Manures

Seeds

Seed is an important input in crop production. In traditional agriculture the farmer used to produce the required seed with great care. There were also traditional practices to preserve such seeds and to test them before the next season. Only in rare cases of crop failures or introduction of new crops could the farmer obtain his seed requirement from outside sources. This situation had gradually undergone a change with the modernisation of agriculture and introduction of improved seeds evolved in research stations. In the wake of green revolution facilitated by the high yielding varieties, the need for a farmer to procure the seed from external sources has become important.

There are several hybrids that are now being used. Production of hybrids is now a specialised task. Institutions with statutory powers have been established for this purpose. National Seed Corporation, State Seed Corporation and Seed Certification Agency belong to this category. Apart from hybrid seeds there are several high yielding varieties in some of the crops like paddy, tapioca, pepper, pulses, oil seeds etc.

Briefly stated below are some of the important varieties in vogue.

Paddy

1. I. R. 8. 68, 2. Jaya, 3. I. R. 20, 4. I. R. 5, Pankaj, 5. H. 4, 6. Mashuri.

While the above mentioned varieties were developed outside the State the following have been developed at the Rice Research Station, Pattambi (1) Annapurna (PTB. 35), Rohini (P. T. B. 36), Aswathi (P. T. B. 37), Thriveni (P. T. B. 38), Jyothi (P. T. B. 39), Sabari (P. T. B. 40), Bharathi (P. T. B. 41). Some of these varieties are eminently suitable for the special soil conditions prevailing in kole Kuttanad regions. Relative to the ones mentioned earlier, the local varieties are of shorter duration and disease resistant. Yields too have been of a high order.

In addition the following newer varieties of crops are in cultivation Paddy Bhadra MO. 4, MO. 5, Kayamkulam 1 (Lakshmy) and Vyttilla 2, and Suvarna modan (PTB. 42).

Tapioca

The Central Tuber Crops Research Institute, Trivandrum has developed H. 1687 (Sree Visakham) and H. 2304 (Sree Sahya), both high yielding cultivators of tapioca with an average yield of 44-45 tonnes/hectare. The mature tuber of these varieties contain 23 to 31% starch and show high degree of field tolerance to disease and less susceptible to pest attacks.

The other improved seed varieties are Cow Pea (PTB. 1) Kanakamani (PTB. 2), Krishnamani, Sesamum (Kayamkulam 2), Thilothama, Sweet Potato (H. 268) and lesser yam (De. 11), Pepper Panniyur 1.

The Seeds Act, 1966 enacted by the Parliament extends to the whole of India to regulate the quality of certain seeds for sale and for matters connected therewith. Under Section 3 (1) of the Act, a Central Seed Committee has been constituted to advice the Central as well as the State Government.

A Central Seed Testing Laboratory is in existence at present. As per the Act the State Government may also establish one or more State Seed Testing Laboratories. The Central Government is empowered to notify the kinds of varieties of seeds, to specify minimum limits of germination and purity and to regulate sales of certification agencies for the States to grant certificates to any person dealing in any seed of notified variety. The certificates can be revoked in case of misrepresentation or failure to comply with conditions under which the certificate has been granted.

The State Government may appoint such persons as Seed Analysts and Seed Inspectors as it thinks fit to enforce the provision of the Seed Act in this State. Under this Act, Penal provision is made for contravention of the provisions of the Act to fine upto Rs. 500 for the first offence and imprisonment for a period upto six months or with fine upto Rs. 1,000 or with both in the subsequent offences.

There are two notified Seed Testing Laboratories in the State namely the Seed Testing Laboratory attached to the Rice Research Station, Pattambi and the Seed Testing Laboratory at Alleppey.

The Additional Director, of Agriculture (Crop Production), Directorate of Agriculture is the State Seed Certification Officer.

In all the districts a district level Officer is declared as the Seed Inspector and he has jurisdiction over the entire District. Besides this 4 Assistant Directors (Quality Control) attached to the Offices of Joint Director, Trivandrum, Alleppey, Calicut and Palghat are also declared as Seed Inspectors in their respective jurisdiction.

From 1976-77 onwards the Department is issuing certified seeds from the State Seed Farms. One of the District Level Agricultural Officers is declared as Field Inspection Officer of each Seed Farm to ensure the quality of seeds.

All the Agricultural Development Officers of Ernakulam, Palghat, Trichur and Wynad are declared as Inspecting Officers of the Registered Seed Growers plots in their respective jurisdiction.

The State Seed Certification Officer will issue authorisation for the procurement and Distribution of seeds based on the inspection reports of the Inspecting Officers pertaining to individual Seed Farms and Registered Seed Growers plots and after examining the analytical reports of the seeds analysed in the notified Seed Testing Laboratories in the State.

The following are the minimum certification standards fixed for the certification of paddy seeds.

Pure Seed (Minimum)	98%
Other Crop Seeds (Maximum)	2 seeds/40 gm.
Inert matter (Maximum)	2%
Weed Seeds (Maximum)	0.1%
Germination (Minimum)	80%
Moisture (Maximum)	13%

Minimum standards fixed for truthfully labelled seeds (Paddy).

Pure Seed	97% Minimum
Germination	70%

(*Source:* Directorate of Agriculture, Trivandrum).

Hereunder is given the institutions of the Agriculture Department where seeds and planting materials are produced.

Trivandrum District

District Agricultural Farm, Peringamala

Clove and Nutmeg seedlings, Rooted pepper cuttings (Panniyoor—1 and Kottanadan), Vegetable seeds and grafts and layers of fruit plants, Mangoes, Sapota, Cashew, Guava, Cocoa seedlings.

Banana Nursery, Peringamala

Banana Suckers of different varieties, Banana bunches.

State Seed Farm, Ulloor

Paddy seeds

State Seed Farm, Chirayinkil

Paddy seeds

Coconut Nursery, Valiathura

Cocount seedlings

Coconut Nursery, Kazhakuttam

Cocount seedlings

Quilon District

District Agricultural Farm, Anchal

Clove and Nutmeg seedlings, Pineapple Suckers, Tapioca stems, Rooted pepper cuttings, Vegetable seeds, Coconut and Pepper.

State Seed Farm, Karunagappally

Paddy seeds

State Seed Farm, Adoor

Paddy seeds

State Seed Farm, Kottarakkara

Paddy seeds

State Seed Farm, Kadakkal

Paddy seeds, Coconut seedlings and Cashew seedlings.

Coconut Nursery, Karunagappally

Coconut seedlings

Cashew Farm, Kottarakkara

Cashew air layers

Alleppey District

District Agricultural Farm, Mavelikara

Coconut seedlings, Rooted pepper cuttings, Tapioca stems, Banana suckers (Robusta and Nendran), Pineapple suckers, Nutmeg and Clove seedlings, Vegetable seeds, Coconut, grafts and layers of fruit plants.

State Seed Farm, Arunoottimangalam

Paddy seeds

State Seed Farm, Pullad

Paddy seeds

State Seed Farm, Veeyapuram

Paddy seeds

Sugarcane Seed Farm, Pandalam

Sugarcane setts

Kayamkulam Kayal Farm, Choolatheruvu

Paddy seeds

Kottayam District

District Agricultural Farm, Kozha

Seedlings of Coconut, Nutmeg, Clove, Rooted Pepper cuttings, Banana suckers, Mango grafts, Sapota grafts and seedlings, Tapioca stems, Pineapple suckers, Jack seedlings, Glyricidia cuttings, Avocado seedlings, Guava layers and seedlings, Mangosteen seedlings, Ornamental plants, paddy seeds, Vegetable seeds and miscellaneous fruits.

State Seed Farm, Valachira

Paddy seeds

State Seed Farm, Kozha

Paddy seeds

Idukki District

District Agricultural Farm, Arikuzha

Rooted Pepper cuttings, Clove, Nutmeg, Vegetable seeds

State Vegetable Farm, Vandiperiyar

Vegetable seeds and Vegetables, Rooted pepper cuttings

State Seed Farm, Karimannoor

Paddy seeds

Ernakulam District

District Agricultural Farm, Neriamangalam

Coconut seedlings, Rooted pepper cuttings, pulse seeds, Vegetable seeds, Paddy seeds, Clove, Nutmeg seedlings, grafts, layers of fruit plants

State Seed Farm, Alwaye

Paddy seeds, Vegetable seeds.

Coconut Farm, Vyttila

Coconut seedlings

State Seed Farm, Okkal

Paddy seeds

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Trichur District

Seed Farm, Mannuthy

Coconuts seedlings, Rooted pepper cuttings, Fruit plants Clove and Nutmeg seedlings, Vegetable seeds, Pulse seeds, Paddy seeds.

State Seed Farm, Kodassery

Paddy seeds

State Seed Farm, Nadavaramba

Paddy seeds

State Seed Farm, Edathuruthy

Paddy seeds

State Seed Farm, Pananchery

Paddy seeds

State Seed Farm, Pazhayannur

Paddy Seeds, Coconut seedlings.

Coconut Nursery, Wadakkanchery

Coconut seedlings

Coconut Nursery, Irinjalakuda

Coconut seedlings

Coconut Nursery, Thekkumkara

Coconut seedlings

Palghat District

Orange, and Vegetable Farm, Nelliampathy

Seedlings of Acid lime, Coffee and Cardamom, Vegetable seeds, Orange, Coffee, Cardamom, Guava Squash, Jam and Jelly.

Integrated Seed Development Farm, Eruthampathy

Sugarcane setts, Tapioca stems, Groundnut seeds, Cotton seeds, Vegetable seeds, Paddy seeds and Coconut seedlings.

Horticultural Development Station, Malampuzha

Horticultural plants, Clove and coconut seedlings.

Central Orchard, Pattambi

Fruit plants, Ornamental plants, Nutmeg and Rooted pepper cuttings.

State Seed Farm, Alathur

Paddy seeds

State Seed Farm, Kunnannur

Paddy seeds

State Seed Farm, Kongad

Paddy seeds, Rooted pepper cuttings.

State Seed Farm, Anaṅganadi

Paddy seeds

State Seed Farm, Muthalamada

Paddy seeds

Malappuram District

District Agricultural Farm, Chungathara

Clove and Nutmeg seedlings, Rooted pepper cuttings, Cashew air layers, Tapioca stems, Vegetable seeds, Pulse seeds, Pineapple, Vegetables and Pulses, Daincha seeds, Sesbania seeds, Banana suckers, Coconut seedlings.

State Seed Farm, Thavanoor

Paddy seeds

State Seed Farm, Anakayam

Paddy seeds

State Seed Farm, Chokkad

Paddy seeds

Coconut Nursery, Parappanangadi.

Coconut seedlings

Seed Garden Complex (SADU)

Coconut seedlings, Pepper cuttings, Spice seedlings etc.

Kozhikode District

District Agricultural Farm, Koothali

Clove and Nutmeg seedlings, grafts and layers of Fruit plants, Coconut seedlings, Rooted pepper cuttings, Banana suckers, Pineapple suckers.

State Seed Farm, Perambra

Paddy seeds

State Seed Farm, Puduppadi

Paddy seeds

Coconut Nursery, Tikkodi

Coconut seedlings

Cannanore District

District Agricultural Farm, Taliparamba

Clove and Nutmeg seedlings, Fruit plants, Mango grafts including Hybrid Mango grafts, Rooted pepper cuttings, Cashew air layers, Paddy seeds, Vegetable seeds, Pulse seeds.

State Seed Farm, Kankole

Paddy seeds

State Seed Farm, Vengad

Paddy seeds

State Seed Farm, Pullur

Paddy seeds

State Seed Farm, Kasaragod

Paddy seeds

Coconut Nursery, Nileswar

Coconut Seedlings

Cashew Progeny Orchard, Adhur

Cashew airlayers

Coconut Nursery, Palayad

Coconut Seedlings

NOTE:—The seed planting materials are sold to the farmers through Development Offices under the Department of Agriculture. A small quantity is sold from the Farms direct. Sales counters are opened at Neyyattinkara, Attingal, Punalur, Shertalai, Changanassery, Thodupuzha, Perumbavoor, Chalakudy, Shoranur, Ponnani, Badagara and Kasaragod to make available agricultural production inputs. Sale cum service depots are also available at the District headquarters at Trivandrum, Calicut, Trichur, Quilon, Alleppey, Kottayam, Ernakulam, and Palghat.

VI. Manures & Fertilizers

The use of farmyard manure is as old as agriculture and ancient treatises like the *Kerala Kalpam* record the usefulness of wood ash, bones and refuse materials for increasing soil fertility and improving crop production. These manures and the recently introduced 'chemical' fertilisers seek to increase the fertility of the soil. The different kinds of manures available and used may be classified under the following three heads: (a) bulky organic manures. (b) concentrated organic manures and (c) artificial or chemical manures. The common bulky organic manures are cattle dung, farmyard manure, compost and green manure. In this group the largest source of supply is cattle. Oil cakes, bone meal and by-products of marine fishing, wood ash etc., form the chief source of concentrated organic manures. Oil cakes are rich in nitrogen and phosphoric acid. Their application is usually to commercial or money crops like plantain but now their use is being extended to paddy crop as well. Fish manures consist of dried fish unfit for human consumption, fish guanos, the cake left after pressing the fish oil, pitted fish and offal, and other refuse from fish curing yards. Among the other natural sources of manure, the most important is wood ash, the product of burning fuel in the millions of hearths in peasant's homes distributed all over the State. It is very difficult to frame an estimate of the quantity of wood ash available in this way. However, the agriculturists take special care to see that proper preservation of wood ash is made in their houses. This actually forms the main source of manure. Among the artificial or chemical manures are the ammonium sulphate, urea, sodium nitrate, super phosphate, potassium sulphate, etc.

On the average the quantity of inorganic manures used by cultivators growing HYV of paddy is 50.6 Kg./ha. whereas for non-high yielding varieties it is only 23 kg./ha. In terms of NPK it amounts to 6.7 kg. Nitrogen, 1.5 kg. Phosphorus, 4.3 kg. Potash per hectare for HYV and 0.6 kg. Nitrogen, 1.7 kg. Phosphorus and 2.3 kg. Potash per hectare for non-high yielding varieties of paddy. The dose of fertilizers for HYV and local varieties according to the recommended package of practices comes to 90 kg. Nitrogen, 45 kg. Phosphorus, 45 kg. Potash per hectare for HYV and 40 kg. Nitrogen,

20 kg. Phosphorus and 20 kg. Potash per hectare for local varieties respectively. Details of Fertilizer consumption in Kerala from 1960-84 are given below: The table indicates that there has been a ten-fold increase in total fertiliser consumption.

(*Tonnes*)

Year	*N* (*Nitrogen*)	*P.O* (*Phosphate*)	*K.O.* (*Potash*)	*Total*
1960-61	5314	4703	2032	12049
1961-62	6264	8461	2248	16973
1962-63	8296	9033	7948	25277
1963-64	10148	9452	8853	28952
1964-65	12746	11210	10252	34208
1965-66	15251	12773	11305	39329
1966-67	21016	13373	11030	45419
1967-68	24000	15689	14853	54542
1968-69	28574	20442	21514	70330
1969-70	30120	20347	21543	72010
1970-71	26335	14183	16139	56655
1971-72	31257	15670	18044	64971
1972-73	31484	22314	20470	74268
1973-74	31691	22609	24546	78846
1974-75	32143	17187	18032	67362
1975-76	31654	14374	16643	62671
1976-77	33553	15696	20157	69406
1977-78	36995	19167	25394	81556
1978-79	45689	23382	30766	99837
1979-80	46341	25402	33872	105615
1980-81	41697	23402	32431	97530
1981-82	40612	23214	30935	94761
1982-83	45233	26555	38065	109853
1983-84	62480	31178	35819	129477

Source: Directorate of Agriculture, Kerala

VII. Agricultural Diseases and Pests and Remedies Employed

The various agencies which often neutralise the favourable effect of many of the factors of crop production are (1) natural calamities, (2) inroads by birds and animals and (3) pests and diseases. Crop damages caused by natural calamities like storms and floods are only occasional. So also are serve droughts. The State is free from invasions of locusts. Stray cattle however cause some damage. The common means of protection of crop from stray cattle is fencing. The common plants used for fencing are *Euphorbia tirucalli, Agava Americana,* prickly *pear lantana indica* etc. Mud walls are also put up in some fields. Pests and diseases, however, are responsible for the great loss of agricultural produce. The damage cannot be accurately estimated as the extent of it depends upon the severity of infestation in any particular year. The most important pests and the remedial measures which may be adopted by the cultivators are described below:

Diseases of Cultivated Crops and their Control

Rice

Blast (Pyricularia oryzae).—Attacks the crop in all stages of growth. Spindle shaped spots with greyish centres and brown margins are produced on leaves. When the neck of the panicle is attacked the grain becomes unfilled and chaffy and the earhead tends to break up at the infected region.

1. Spray the crop with any of the following: Ediphenphos 500 ml. per hectare in 500 litres of water (HV). Kitazin 500 ml. per hectare in 500 litres of water. Aureofungin Sol. 50 gm. per hectare in 300 litres of water. Zineb 2 kg. per hectare in 500 litres of water. Carbendazin 500 gm. in 500 litres of water.

2. Avoid susceptible varieties in blast endemic areas.

3. Avoid excess nitrogen application.

Sheath Blight (Rhizoctonia solani).—Greyish green irregular lesions with dark line on margins develop in the leaf sheath near the water level and spread upward. Lesions enlarged and coalesce with other lesions. Severe infection results in poor filling of grain. Lesions may develop on leaves also.

1. Spray Ediphenphos (500 ml/ha.) or Carbendazin (500 gm/ha) or Captofol (1.5 kg/ha) in 200 litres of water for low volume and 500 litres for high volume.

2. Reduced nitrogen application, wider spacing of plants and adequate supply of potash (45 kg. K_2O per hectare) help to control the disease in areas where sheath blight is severe.

3. Avoid susceptible varieties.

Sheath Rot and Glume Discolouration (Sarcocladium oryzae).—Oblong or irregular lesions with brown margins and grey centres or greyish brown throughout. The disease occurs on the upper-most leaf sheath enclosing the young panicles which either remain the sheath or emerge only partially. Due to glume discolouration a large number of grains become black in colour.

Spray Ediphenphos 500 ml/ha. at the time of panicle emergence.

Stack Burn (Alternaria padwickii).—Large oval or circular dark brown lesions with narrow distinct margins on the leaf blade. Spray Zineb 2 kg. or Mancozeb 2 kg. per ha.

Brown Spot (Helminthosporium oryzae).—It is a fungal disease which attacks germinating seeds, leaves and developing grains. Typical leaf spots are small oval or oblong, light brown or straw centre and dark reddish brown margin. Larger spots are usually pale with greyish centre. The spots are characterised by light yellow halo around the outer edges.

Deficiency of Zinc, Manganese, Potassium, etc., and adverse soil conditions like salinity, undecayed organic matter etc., predisposes the crop to this disease. When the disease is mild no control is needed; if it is severe the disease can be controlled by spraying the crop with one of the following fungicides.

Zineb 2 k.g. or Mancozeb 2 k.g. per hectare in 500 litres of water. Arueofungin Sol. 50 gm. in 300 litres of water or Ediphenphos 500 ml. per hectare in 500 litres of water, streptocycline 15 gm|ha. in 300 litres of water.

Bacterial Leaf Blight (Xanthomonas campestris PV oryzae).—Kresek is the systemic form of bacterial blight. In young plants the leaves wilt, and decay rapidly. Usually occurs just after transplanting till active tillering.

In plants nearing maturity the lesions may start anywhere on the leaf but usually near the tip, and may cover the width of the blade. The lesions are pale green to gray green initially

and turn white to golden yellow after a day or two and the edges of these lesions are usually irregular or wavy. Drying of leaves back from tip and curling. This may extend even into the leaf sheath in highly susceptible varieties.

Early infection (Kresek) can be checked by applying bleaching powder at the rate of 5 kg. per hectare in the soil or in the irrigation water.

Spray Agrimycin or Paushamycin or Plantomycin at 250 p.p.m. (750 gm. in 500 litres of water|ha.) or Strepto-cycline 15 gm|300 litres of water.

Soil condition should be improved. It is advisable to spray only if the incidence of bacterial leaf blight is confirmed by testing the presence of the bacterium (Bacterial ooze). Reduced nitrogen and wider spacing of plants help to reduce the intensity of the disease.

Udbatta Disease (Ephelis oryzae).—The disease is usually noticed after the emergence of the panicle. In the infected panicle, the florets get glued together to the main rachis by the viscid spore mass which hardens into a crust. (The whole panicle transformed into a cylindrical rod covering with white mycelium).

The panicle emerges from the leaf sheath as straight, dirty coloured hard, cylindrical spike, resembling, "Agarbathi" or "udbatti". No grain is formed resulting in 100 per cent loss in infected earheads. The infected panicle and the flag leaf are reduced in size.

The disease is endemic in nature and confined to the hilly regions of Wynad and Idukki (500-1000 m.) A number of grasses have been reported as collateral hosts of the pathogen.

The pathogen is internally seed-borne and hot water treatment at 52-54° C for 10 minutes is recommended as a control measure. Another practical measure is to use healthy seeds collected from disease free areas, i.e., plains.

Coconut

Leaf Rot (Helminthosporium halodes, Colletotrichum sp., Gilocladium sp.)—Blackening and shrivelling up of distal ends of leaflets in the central spindle and younger leaves. Later

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the affected portions break off in bits. Younger leaves get infected first. The tree gradually weakens and the yield reduces.

Spray the crown and leaves with 1% Bordeaux mixture or 0.5% Copper Oxychloride fungicide or 0.4% Mancozeb in January, April, May and September (6 gm. of Dithane M-45 per tree in 1.5 litres of water). While spraying care has to be taken to spray the spindle leaf. Improve general condition of palm through proper manuring and management.

Root (Wilt) Disease (Cause unknown).—The characteristic symptom is the flaccidity of leaflets General chlorosis, wilting of the leaves deterioration and decay of root system. The leaflets also curve inwardly so that the whole frond develop a cup like appearance. Abnormal shedding of buttons and immature nuts are also noticed. Marginal and tip necrosis of leaflets. These symptoms are slow in developing.

Destroy heavily infected trees showing poor yield (less than 10 nuts|annum) as well as diseased seedlings along with stumps, and replant with hybrids such as D x T and T x D. Balanced manuring and proper cultural practices help in maintaining the yield. Use 0.34, 0.17 and 0.68 kg. each of N, P_2O_5, and K_2O per palm in the form of Urea, Rock Phosphate and MOP. In addition apply 20-50 kg. CM or GM and 2 kg. of Dolomite per tree. One kg. lime and 500 gm. Magnesium Sulphate can be used for one kg. Dolomite. Adopt mixed farming by growing a grass-legume mixture and irrigation.

Bud Rot (Phytophthora palmivora).—Central leaves wither with yellowish discolouration and get easily detached. The rottings spread to the soft tissues of the bud and destroy it.

In the early stages of the disease remove affected tissues and treat the crown with Bordeaux paste. A protective covering should be given till normal shoot emerges. Burn all disease affected tissues removed from the palm. Spray 1% Bordeaux mixture on spindle leaves and crown of deseased and neighbouring palms.

Stem Bleeding (Thielaviopsis paradoxa).—The stem is generally affected and reddish brown liquid oozes out from the longitudinal cracks in the steam, about 1 metre above ground level. Bleeding patches may appear higher up the trunk. The

affected region gets rotted and infection spreads to surrounding tissues. Fatal instances are not uncommon.

Chisel out all infected tissues and dress wound with Bordeaux paste or hot coal tar. Avoid any mechanical injury to the stem. Improve general condition of palm through proper manuring and management.

Mahali (Fruit Rot and Nut Fall).—Shedding of female flowers and immature nuts are the symptoms of the disease. Lesions appear on the young fruits or buttons near the stalk which later develop into decay of the underlying tissues. Spray 1% Bordeaux mixture or Copper oxychloride preparation (0.5%) on the crown of palms once before the monsoon and once or twice later on at intervals of 40 days.

Grey Blight.—The symptoms appear in the mature leaves of the outer whorl as yellow specks encircled by a greyish band which later becomes greyish white. The spots coalesce into irregular necrotic patches causing extensive leaf blight. In advanced stages the tips and margins of the leaflets dry and shrivel giving a burnt appearance.

Remove older disease affected leaves.

Spray leaves with 1% Bordeaux mixture.

Arecanut

Yellow leaf disease (Cause unknown).—Yellowing of the outer whorls of leaves, tapering of the stem and shortening of the leaves. Discolouration of the kernel is also noticed.

Keep up of health of trees by manuring and proper cultivation. Improve drainage conditions of the garden.

Koleroga or Mahali or fruit rot (Phytophthora palmivora).—Rotting and premature shedding of green nuts during June-August.

Spray bunches with 1% Bordeaux mixture just before the onset of south west monsoon and again 40 days later as prophylactic measure. If monsoon is prolonged give a third spray. Use Rosin-soda adhesive to ensure tenacity of the spray deposit. Remove and burn all fallen and infected nuts.

Inforcscence Dic—Back and Button Shedding (Colletotrichum gloeosproioides.—The initial symptoms start with shedding of the female flowers (buttons). The rachis turns yellowish at first, then brown and finally becomes black in colour and starts drying from the tip downwards and hence the name 'die-back'. The infected portion is studded with reddish fructification of the pathogen, arranged in concentric rings. The disease is widely prevalent and is very destructive.

Application of NPK fertilizers at the recommended dose and timely irrigation of palms can reduce the extent of damage. Spraying Zineb 4 gm. in one litre of water twice, once just after female flowers are set and again 15-28 days later or spray Aureofungin Sol. at 50 p. p. m.

Pepper

Quick Wilt or Foot Rot (Phytophthora sp.)—Disease usually occurs during south west monsoon periods. Two types of symptoms are noticed.

Wilting of the vine is the characteristic symptom. Usually infection takes place on the vines just above the soil level. Affected portion becomes soft and decayed and leaves turn yellow and fall. When the infection occurs on the leaves black irregular spots appear which enlarge in size and the leaves fall. The vines break at the nodal regions. Prior to south west monsoon adopt garden sanitation. After the receipt of 2 or 3 south-west monsoon showers drench the soil around the base of vines with 0.1%. Methoxy ethyl mercuric chloride at the rate of 5-10 litres per standard and apply 10% Bordeaux paste mixed with rosin soda around the basal portions of the exposed stem. Spray 1% Bordeaux mixture mixed with rosin soda at the peak period of south-west monsoon.

To control rotting disease of seedlings in nursery, plant the cuttings in the potting mixture drenched with 0.05% solution of Methoxy ethyl mercuric chloride followed by weekly foliar application of 0.1% solution of Captofol from the time of leaf emergence.

Slow wilt.—The leaves of the affected plants appear pale and yellow. The root system shows decay and the vines die gradually during the course of months.

Apply Dasanite granules after taking basins at the rate of 25 to 30 gm. per vine and drench the soil with any chemical containing the a. i, Methoxy Ethyl-Mercuric Chloride (MEMC) 2.5 litres per sq. metre. Drenching should be done in May-June and again in August-September.

Sugarcane

Red Rot (Colletotrichum falcatum, (Glomerella tacumanensis).—Withering and drying up of leaves start from the third or fourth leaf. Mid ribs and leaf sheath are most often seriously affected. Inside of the stem rots and rind losses its bright natural colour. The stem emits foul smell also.

Use healthy setts from disease free localities. Dip cut ends of setts in 0.25% solution of any preparations containing 3% Mercury as Methoxy Ethyl Mercuric Chloride (MEMC) or Artean solution (0.25%) before sowing.

Smut (Ustilago scitaminae).—Long dusty black whip like shoots in the apex are produced. This will be covered with a powdery mass of black spores.

Remove the whip as it appears. Take steps to prevent spread of spores. Do not ratoon an infected crop. Cultivate resistant varieties.

Mosaic (Virus disease).—Symptoms appear as linear patches of light and dark green colour on the leaves. Secondary symptom is the mottling or marbling of the stem forming cankered areas.

Use resistant varieties. Rogue out infected canes. Select healthy setts for planting.

Ginger

Soft Rot (Pythium spp.).—Yellowing of leaves which gradually wither and droop. Later whole shoot is affected and dry up. The rot begins at the base of the shoot and extends to rhizome which becomes watery and soft in character.

Plant on raised beds; eradicate infected plants and drench the soil with Cheshunt compound at the rate of 2.5 litre per sq. m. or with 0.1% Organic Mercurial fungicide (3%). Select healthy rhizomes as seed material. Treat seed rhizome

with 0.25% Organic Mercurial fungicide (3%) before storage and again before sowing. Improve drainage conditions of the field.

Leaf Spot.—Spray Thiram 0.2%.

Cardamom

Mosaic or Katte (Caused by a virus).—General chlorisis and mottling of leaves with thin broken stripes of deep green tissues over the surface . Size of leaves reduce. The disease appears in all stages of growth. Infected clumps will be smaller in size with fewer tillers.

Eradicate all diseased plants promptly once in two months. Replant with healthy seedlings raised from seeds in disease free area. Remove all alternate hosts of virus. Spray Quinalphos or Fenthion or Phenthoate or Formothion or Methyl Parathion at 0.03% or Fenitrothion or Dimethoate at 0.05% concentration to control the insect sector viz., Banana aphids.

Clump Rot or Rhizome Rot (Pythium spp.).—Cause rotting of rhizomes and the roots by which the shoots wilt. Leaves of affected plants become yellow and droop. The affected shoots become brittle and easily break off from the rhizome at the bulbous base. Apply lime followed by Ammonium Phosphate or Super Phosphate at 100 Gram per clump to check spread of disease.

Azhukal Disease (Phytophthora sp.).—Affects tender shoots, panicles and capsules. Rotting occurs. Spray Bordeaux mixture at 1% with adhesive by the commencement of monsoon and repeat 2-3 times upto November. Give drenching spray to panicles with 1% Bordeaux mixture during July-August.

Damping off (Phythium sp., Rhizotonia solani).—Seedings wither and die.

Drench soil with 1% Bordeaux mixture. Reduce excessive soil moisture and humidity. Avoid over crowding of seedlings in nursery.

Turmeric

Leaf Spot (Colletotrichum capsici).—Symptoms appear on leaves as elliptic or oblong spots which coalesce to form irregular patches. The central portion of the spot is papery in

texture with black pinhead like spots on the surface and the patches gradually dry up. In severe cases most of the leaves dry up presenting a scorched appearance. Spray with 1% Bordeaux mixture or 0.2% Mancozeb.

Early Wilt or Rhizome Rot.—Drench the soil with 1% Bordeaux mixture or Cheshunt compound.

Banana

Bunchy top diseases (Caused by a virus).—Crowding of leaves at the top. The size of leaves get progressively reduced. Chlorotic streaks can also be noticed on the leaf lamina. Control the insect vector (For details see the Chapter for Pest Control). Use disease free suckers for planting. Karpuravally, Kanjikela, Njalipoovan and Koompilakannan are tolerant varieties to Bunchy top disease.

Sigatoka Disease (Cercospora musae).—Dark brown to black liner lesions develop on young leaves with an yellow halo. On older leaves typical brown spots with grey centre and surrounded by narrow well defined margins are formed. These spots coalesce and spread the whole lamina resulting in the death of tissues. Infection spreads to petioles and these leaves may droop down. The disease affects the yield considerably

Remove and destroy all severely affected leaves. Spray one per cent Bordeaux mixture or Captofol 0.3% on the upper and lower surfaces of the leaves soon after the appearance of initial symptoms. Disease appears with the commencement of S. W. monsoon. In severe cases of infection fungicidal application is to be repeated for 5-6 times at fortnightly intervals. Mineral oil 1% emulsion is also effective.

Pineapple

Leaf spot.—Spray 1% Bordeaux mixture (225 litres|ha.) or Zineb or Mancozeb or Ziram (1 kg. in 225 litres of water|ha).

Tapioca

Leaf spot (Cercospora heningsii).—Symptoms appear as almost circular reddish brown spots on the older leaves. If infection is severe spray 0.4% Ziram 0.4% Zineb can also be used.

Cassava Mosaic (Virus disease).—Leaves become small curl and get distorted; internodes are shortened. Plants get stunted. Select stem cuttings from disease free plants for planting.

Rogue out diseased plants. Cultivate tolerant varieties like H. 97.

By spraying 0.03% Dimethoate 3 to 4 times at monthly intervals in the first 4 months, the insect vector, White fly (Bemisia sp.) can be controlled.

Bacterial Blight (Wilt) (Xanthomonas manihotis).—Disease becomes evident by loss of turgidity of one or two full grown leaves below the growing point which wilt rapidly. Subsequently all fully opened leaves wilt and drop except the bud leaves. Browning of vascular tissues of stem and tubers can be observed when split open. The tubers finally rot.

No proper control measures are known against this disease. The only method to prevent the incidents of the disease is cultivation of tolerant|resistant varieties. Local varieties like Paluvella, Anamaravan, Rottivella etc., M-4 and hybrid varieties like H.97, H-226, H.1687 etc., are found to be tolerant|resistant to infection.

VEGETABLES

Bhindi

Yellow vein mosaic (Virus disease).—Clearing of veins and leaves turn yellow. Leaves become curled and twisted. Infected plants become stunted and produce small malformed and pale fruits.

Rogue out diseased plants. Spray insecticides to check the insect vector. Use tolerant variety—Pusa savani.

Leaf Spot (Cercospora hibisci).—Black patches appear on the lower surface of the leaves. Spray 1% Bordeaux mixture.

Chillies

Powdery Mildew (Leveillula taurica).—White growth of fungus on leaves and tender branches. Dust fine Sulphur (20 kg|ha.) or spray Wettable Sulphur (2 to 4 kg|ho.) or Dinocap (0.05% to 0.1%).

Damping Off (Pythim aphanidermatum).—Seedlings wither and die. Drench the soil with Cheshnut compound or 1% Bordeaux mixture.

Anthracnose (Colletotrichum capsici).—Defoliation and drying up of twigs. Affected fruits decay. Spray 1% Bordeaux mixture.

Cucurbits

Powdery mildew (Erysiphe cichoracearum).—White powdery growth on the leaves in small patches which soon cover the entire leaf surface. Spray 0.5% Nitrophenol.

Tomato

Bacterial wilt (Pseudomonas solanacearum).—The plants wilt suddenly. Seed treatment with Organo Mercuric compounds. Graft on *Solanum torvum.*

Damping off (Pythium sp.).—Seedlings wither and die, Drench the soil with Cheshunt compound or 1% Bordeaux mixture.

Mango

Die Back.—Cut and remove affected parts and apply Bordeaux paste to cut ends.

IMPORTANT CROP PESTS AND THEIR CONTROL

Paddy

Rice swarming Caterpillar (Spodoptera mauritia).—Caterpillars appear in swarms and eat away the leaves in the early vegetatives phase. The presence of the caterpillars in the early stages can be ascertained by sweeping with a hand net.

Spray the crop with BHC 50 W. P. (2.5 kg|ha.) or Methyl Parathion 50 EC (500 ml|ha.) or Carbaryl 50 W.P. (2.5 kg|ha.) or Endosulfan or Trichlorfon or Fennthion as soon as the caterpillars are noted.

Rice stem Borer (Triporyza incertulas).—In the vegetative phase the central shoot is seen dead turning yellow in colour (dead heart). In the ear bearing stage the earhead appears completely chaffy and white in colour (white earhead). Both

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come out easily when pulled out and show indication of caterpillar attack at the tips.

1. Collect and destroy egg masses from the nursery plants.
2. Cultivate tolerant varieties like IR 20 in endemic areas.
3. The areas where stem borer occurs as a regular pest, apply one of the following insecticides, first 15-20 days after transplantation and then at the boot leaf stage with minimum water level.

Fenthion 100 EC (500 ml|ha.), Quinalphos 75 EC (1000 ml|ha.), Quinalphos 5 G (20 kg|ha.), Fenitrothion 50 EC (1000 ml|ha.), Fenitrothion 100 EC (500 ml|ha.), Phosphamidon 100 EC (250 ml|ha.), Monocrotophos 40 EC (600 ml|ha.), Carbofuran 3 G (18 kg|ha.),Carbaryl 50 WP (2.5 kg|ha.), Methyl Parathion 50 EC (500 ml|ha.).

Rice Bug (Leptocorisa acuta).—Look for the presence of the bug in the field during the early ear-bearing stage. When the plants are disturbed the bugs are seen flying away emitting a characteristic odour. Due to desapping grains show brownish discoloured patches on the husk.

1. Keep the field and bunds free of weeds and grasses.
2. Avoid overlapping cultivation in an "Ela".
3. When the bug is seen in large numbers immediately apply one of the following insecticides.

Carbaryl 50 WP (2.5 kg.|ha.), Formothion 25 EC (1000 ml|ha.), Methyl Parathion 50 EC (500 ml|ha.), BHC 10 D. P. (25 kg.|ha.), Malathion 50 EC (1000 ml|ha.).

Since the occurrence of rice bug coincides with the flowering stage of the crop, application of the insecticides may be done before 9 a.m. or after 3 p.m. so that the fertilization of the flowers may not be adversely affected.

Gall Midge (Pachydiplosis oryzae).—Presence of yellowish or violent coloured tubular outgrowths in the place of the central leaf is the symptom of this pest. This is called 'Silver shoot'. The symptoms appear from the nursery to the tillering phase.

1. Avoid late transplantation during the 1st crop season.
2. In areas where the pest is of regular occurrence, apply granules of Phorate, Carbofuran or Quinalphos in the nursery 10-15 days after sowing.

3. The nursery treatment has to be followed by main field treatment 10-15 days after transplantation using one of the following insecticides.

Carbaryl 50 W. P. (2.5 kg.|ha.), Quinalphos 25 EC (1000 ml|ha.), Quinalphos 5 G (20 kg|ha.), Phosphamidon 100 EC (250 ml|ha.), Phorate 10 G (12.5 kg|ha.), Carbofuran 3 G (18 kg|ha.).

Paddy Leaf Roller (Cnaphalocrosis medinalis).—The leaves of the plants are seen folded or webbed together with white patches on them indicating the areas fed on by the caterpillars. When such folded leaves are opened up green caterpillars are seen wriggling out and falling to the ground. Appearance of white patches in the field indicates the attack of the pest. All the stages of the crop are attacked.

1. Open up leaf folds with a thorny twig.
2. Apply one of the following insecticides, in the fi where the symptoms of the attack is manifested.

Quinalphos 25 EC (1000 ml|ha.), Carbaryl 50 WP (2.5 kg|ha.), Monocrotophos 40 EC (600 ml|ha.), Methyl Parathion 50 EC (500 ml|ha.), Fenitrothion 50 EC (1000 ml|ha.), Fenthion 100 EC (500 ml|ha.), Phosalone 35 EC (1000 ml|ha.).

Brown Plant Hopper (Nilaparvata lugens).—Yellowish circular patches appear here and there in the field. The plants in these areas very soon dry up (Hopper burn) and the yellowing and drying extend rapidly. Examine the plants as soon as the yellowing appears. Presence of the hoppers at the base of the plants confirms the infestation.

1. Use resistant|tolerant varieties such as Jyothi, Bharathi, Pavizhom, etc., for planting.
2. Apply one of the following insecticides as soon as the yellowing symptom is observed, covering the patches and the area immediately surrounding the patches.
3. Drain away the water from the field and keep it in a moist condition.
4. In Kuttanad tract early planting of paddy in September-October is advisable wherever possible.

Carbaryl 50 WP (2.5 kg|ha.), Quinalphos 25 EC (1000 ml|ha.), Fenthion 100 EC (500 ml|ha.), BHC 50 WP (2.5 kg|ha.), BHC 10 DP (25 kg|ha.), Phosphamidon 100 EC (250 ml|ha.), Carbofuran 3 G (18 kg|ha.), Monocrotophos 40 EC (600 ml|ha.), Phosalone 35 EC (1000 ml|ha.).

While spraying and dusting, care should be taken that the insecticides reach the base of the plants.

Rice Hispa (Nyhaphula depunctalis).—Leaves of plants seen eaten by the caterpillars which remain within small cylindrical cases and are seen hanging on the leaves. It occurs on ill drained fields. The cases may be seen floating on water also.

1. Drain away the water from the fields.
2. If infestation is severe dust with BHC 10 D. P. (25 kg|(ha.) or of Carbaryl 10 D. P. (30 kg.|ha.) or spray BHC 50 WP or Carbaryl 50 WP at 1% concentration.

Rice Hispa (Discladispa armigera).—In the early stages of the crop, white patches with stunted growth are seen. Closer examination reveals the presence of small black spiny beetles. The adults feed on the green tissues of leaves and the feeding scar appear as white lines. The grubs mine the leaves causing formation of white blotches.

Apply BHC 10 D. P. (25 kg|ha.) in areas where infestation occurs.

Whorl Maggots.—Infestation is common in nurseries and in main fields upto 4-6 weeks after transplantation.

Yellowish patches and streaks are seen along the margin of leaves which may become deformed.

Apply Phorate 10 G (12.5 kg|ha.), if infestation is severe.

Rice Jassids (Tettigella spectra, Niphotetix bipunctatus).—General yellowing of the leaves is seen if the attack is severe. When the plants are disturbed the Jassids are seen jumping out.

Apply any one of the following insecticides. Carbaryl 50 W.P. (2.5 kg|ha.), Phosphamidon 100 (250 ml|ha.), Quinalphos 25 EC (1000 ml|ha.), Monocrotophos 40 EC (600 ml|ha.), Fenthion 100 EC (500 ml|ha.), Fenitrothion 50 EC (1000 ml|ha.).

Rice Thrips.—The crop is highly susceptible in the nursery stage and for the first 20-25 days after transplanting|sowing. The tips of leaves get folded longitudinally into needle like outgrowths and turn whitish. In severe cases the lower leaves

also turn yellowish. The infestation may be rated as mild if there are less than 3 dry needle like leaves and as severe if there are more than 3 outgrowths with the lower leaves also showing chlorosis and scorching.

In severe infestations apply Carbaryl 50 WP (1.25 kg|ha), plus DDVP 100 EC (250 ml|ha.), or Dimethoate 40 EC (1 litre| ha.), or Quinalphos 25 EC (1 litre|ha.).

Rice Root Nematode (Hirschmanniella oryzae).—Attacks paddy roots and make them hollow. Affects absorption of water and nutrients. Plants show stunted growth in patches. Tiller production is affected.

Treat the nursery with Carbofuran 0.75 kg ai|ha. and dip the seedlings in 0.2% Dimethoate for six hours before transplanting in tracts where nematode attack is detected.

Sugarcane

Shoot borers

The early shoot borer (Chilotraea infuscatellus)

The shoot borer (scripouhaga niveilla).—Caterpillar attacks 1-3 months old seedlings causing 'Dead heart'. Spray Quinalphos 0.025% or Fenitrothion 0.05% or Fenthion 0.05%.

Termites.—Damage planted setts and sprouts.

Dust around the setts in furrows at the time of plantnig with Aldrin|Heptachlor|Chlordane 5-10% DP at the rate of 15 kg|ha.

Coconut

Rhinoceros Bettle (Oryctes rhinoceros).—The adult bettle bores into the unopened fronds and spathes. The attacked frond when fully opened shows characteristic triangular cuts.

Hook out the bettles from attacked palms by using beetle-hook. Fill up the topmost 3 leaf axils around the spindle at all stages in the crown with a mixture of 5% BHC or Chlordane and sand in equal proportions by volume or BHC 10% and sand in the proportion of 1:2 as a prophylactic measure thrice in an year, April, September and December. Treat manure pits and other breeding sites with BHC|Carbaryl to control grubs. Use 116 gm. of 50% BHC or Carbaryl for every one cubic metre of breeding material. The treatment will have to be repeated every three months.

Red Palm Weevil (Rhynchophorus ferrugineus).—Grubs bore into tree trunks; central shoot starts drying and whole crown falls down.

Inject attacked palms with Pyrocone—E 2|20 or Carbaryl 1% (10 ml. of Pyrocone-E or 20 gm. of Carbaryl 50 W. P. in one litre of water|palm) or Trichlorphon 0.2% suspension i. e., 4 ml. of Trichlorphon 50 EC in one litre of water per palm using a funnel.

Alternatively apply 1% DDVP or Aluminium phosphide 1 to 2 tabs per tree as a curative measure. As a prophylatic measure apply mixture of sand and 5% BHC or Chlordane to all leaf axils of young palms of age 3-25 years.

Black Headed Caterpillar (Nephantis serinopa).—Caterpillar feeds on green matter of lower leaf surface remaining within galleries of silk frass. The severity of attack will be marked during summer months from January to May. As a prophylactic measure;

1. Cut and burn the first affected fronds.
2. Arrange for liberation of Braconid|Bethylid|Elasmid parasites as soon as infestation is noted.
3. When infestation is very severe and not amenable for control by parasites, spray the under surface of the fronds with BHC 50 WP 0.2% or Malathion 0.5% or Quinalphos 0.5% or Endosolfin 0.5% or Phosalone 0.05%.

After application of insecticides follow up by liberation of larval and pupal parasites from the 21st day of application.

Cock Chafer Beetle (Leucopholis caneophora).—White grubs in soil feed on roots turning the palms nearly barren, leaves turn yellowish in severe cases.

Plough or dig the infested soil synchronising with premonsoon showers. Broadcast and incorporate into soil 5% Aldrin| BHC|Chlordane at 120 kg|ha. twice a year in April-May and August-September.

Coreid Bug.—The attacked buttons do not develop and tender nuts become barren. Apply BHC|Carbaryl 0.2% or Endosulfan 0.05% on the newly opened inflorescence after the receptive phase of female flowers and spray the entire crown excluding the leaves and older bunches.

Arecanut

Areca spindle bug (Carvalhoia arecae).—Adults and nymphs feed on tender leaf spindle which fail to open out fully. Tender leaves when attacked show dried up spots all over. Severe attack leads to complete shedding and drying of leaves.

Spray crowns with BHC 50% WP (250 gm. in 100 litres of water). The spray should reach the leaf axils. Repeat spraying after 30 to 35 days if pest incidence continues.

Mites.—Leaves turn yellowish and dry up in young plants and seedlings. Spray under surface of leaves with Chlorbenzilate (0.025%) Dichloro benzilic acid (0.025%) or Carbophenothion (0.05%) to control the red and white mites. Repeat spraying at intervals of 15-20 days if there is pest recurrence. To control orange coloured mites spray bunches with Dimethoate at 0.05% concentration.

Inflorescence Caterpillar.—Force open the inflorescence out of the enclosing spathe and spray inflorescence with Malathion 50 EC (250 ml. in 100 litres of water). Also control slugs which predispose inflorescence to the attack of caterpillar, by using bait of Metaldehyde.

Root Grub.—Drench soil with Chlordane (0.07% suspension after loosening the soil around the base of the palm to a depth of 10 to 15 cm. during May and September-October. Repeat applications for 2 or 3 years consecutively. Or apply Aldrin|Chlordane|Heptachlor DP on the soil at the rate of 50 kg|ha. or Phorate 10% granules around the palms.

Brinjal

Shoot and fruit caterpillar (Leucinodes orbonalis).—Caterpillar bores into and damage tender shoots and fruits. Spray Carbaryl 0.15% at intervals of 15 to 20 days.

Epilachna Beetles (Epilachna sp.).—The grubs and adults scrape green leaf tissues damaging leaves severely.

Spray Carbaryl 0.2%.

Brinjal Lace Wing (Urenthis echinus) and Brinjal Melay Bug (Citrococcus insolitus).—Spray Quinalphos 0.025%.

Mite (Tetranychus telarius).—Damage leaves and tender shoots by desapping.

Spray Dimethoate at 0.05%.

Chilli, Tomato

Spray Quinalphos 0.25% for controlling Mealy bugs and Lacewings. Dimethoate at 0.05% is effective in controlling Mites, Aphids and other sucking insects.

Bhindi

Shoot and Fruit Borer (Earias fabia).—Caterpillar bores into and damages the shoots and fruits, Remove drooping shoots and damaged fruits, spray 0.15% Carbaryl at intervals of 15-20 days.

Jassids.—Spray Quinalphos, Fenthion or Fenetrothion each at 0.05% concentration.

Aphids.—Apply Dimethoate 0.05%.

Nematodes.—Apply saw dust or paddy husk at 500 gm/plant or Neem leaves or Eupatorium leaves at 250 gm/plant in the basins one week prior to planting and water daily.

Tapioca

Tapioca Scale (Aenidomytilus albus)

Red Mite.—Flat scales in larger numbers suck sap from stem, weakening the plants. Spray Dimethoate or Methyl Demeton 0.05% at monthly intervals.

Stems have to be sprayed with 0.05% Dimethoate before storing as prophylaxis.

Sweet Potato

Sweet Potato Weevil.—Dip the wines in 0.05% Fenthion or Fenitrothion or Monocrotophos suspensions for 5 to 10 minutes prior to planting. Spray the crop first one month after planting and subsequently three times at tri weekly intervals with Fenthion or Fenetrothion or Monocrotophos 0.05% suspension to control field infestation.

Sesamum

Leaf and Pod Caterpiller.—Remove affected leaves and shoots and dust with BHC 10% or Carbaryl 10% DP.

Gall Fly.—Give preventive spray with 0.2% BHC suspension.

Groundnut

Red Hairy Caterpillar.—Spray the crop with Carbaryl 0.15%.

Leaf Roller.—Dust the crop with BHC 10%

Banana

Stem Weevil (Cosmopolites sordidus).—The grubs tunnel within underground stems, stunting or killing the plant.

Use healthy suckers. Dip the suckers in 0.2% HCH suspension or apply Aldrin 5% dust at the rate of 50 gm. per pit before planting.

Nematodes.—Dip the suckers in 0.1% Aldicarb solution for 30 minutes before planting.

Apply Carbofuran or Aldicarb at 1 gm ai|plant on 75 days after planting and once again at 1 gm ai|plant on 105 days after planting, if infestation is severe.

Banana Aphids (Pentalonia nigronervosa).—Apply 25 gm. of Phorate 10% G in the pit around rhizome at the time of planting. After 75 days of first application apply 25 gm. of above granule in the base or 12.5 gm. in the leaf axils. After 90 days of the 2nd application, apply 25 gm. of granule in the base or 12.5 gm. in the leaf axils. When the granules are applied around base of plants there should be sufficient soil moisture. Otherwise the plants should be watered after broadcasting the granules.

Pineapple

Mealy Bugs.—Apply Quinalphos 0.025% or Fenitrothion 0.05% or Fenthion 0.05%. Control ants which act as carriers of Mealy bugs from plant to plant, by dusting BHC 10% DP in nests and in places where they occur in large numbers.

Mango

Mango Hoppers (Idiocerus sp.).—Suck juice from tender leaves, shoots and flower stalks. Leaf tips and margins dry up. Flowers and tender fruits drop. Sooty mould develops on leaves and shoots.

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Spray Carbaryl 0.2% or Malathion 0.1% at the time of flowering.

Mango Stem Borer (Batocera rufomaculata).—Larva bores into wood and makes tunnels, killing branches and at times whole tree.

Apply paste made of crude Carbolic acid (430 ml.), soft soap (1 kg.) and hot water (3.7 litres) to holes in the bark and plug the holes or inject. Aluminium phosphide tablets into the burrows. Also remove affected branches.

Fruit Fly (Dacus dorsalis).—Maggots within pulp damage it leading fruit to rot. Spray Malathion 0.1% emulsion suspension containing 2% sugar on the foliage. Also collect and destroy attacked fruits that rot and drop down.

Leaf Miners, Leaf Cutters.—All these appear on tender shoots, causing serious damage to the tender leaves and growing points.

Spray Carbaryl 0.1% or Methyl parathion 0.2% at fortnightly intervals till tender leaves become green.

Shoot Midge.—Causes drying of shoots. Apply Carbaryl 0.1% or Dimethoate 0.05% or Phosphamidon 0.03% at the time when fresh shoots appear.

Mandarin Orange

Citrus Butterfly.—Pick out caterpillars and spray with a contact insecticide.

Stem Borer.—Cause withering of branches. Gum exudes from holes. Chip off the affected new shoots and spray 0.2% BHC suspension once in 3 months. Inject the bore tunnel with 1% Dichlorvos.

Aphids.—Apply Dimethoate 0.05% or Monocrotophos 0.05%.

Cashew

The Tea Mosquito (Helopeltis antonii).—Adults and nymphs suck sap from tender shoots, inflorescence and flowers causing drying up of these shoots. Show die back symptoms.

Spray 0.05% Endosulfan or 0.1% Carbaryl or 0.05% Quinalphos or 0.03% Phospamidon thrice in an year; 1st

(October-November) 2nd at the time of panicle emergence in December|January; 3rd at fruit set initiation, complete flowering in January|February. For grown up trees about 15 litres of spray fluid would be required at high volume discharge rate and 2.5 litres at low volume discharge rate. Maintain the concentration of insecticides for low volume application at 0.1% for Endosulfan and Quinalphos and 0.2% for Carbaryl and 0.06% for Phosphamidon.

Cashew Root Borer

Cashew Tree Borer (Ploceoderus ferrugineus).—Grubs tunnel within wood, tree is weakened and death follows. Drench base of tree with BHC 0.1% suspension. Cut and burn badly affected portions or inject Aluminium phosphide tablets at the rate of one tab: per hole and seal immediately with cement or mud.

Pepper

Pepper Pollu Beetle (Longitarsus nigripennis).—Grubs bore into berries making them hollow. Adults feed on tender leaves.

Spray Dimethoate 0.06% or Quinalphos 0.025% once in June-August and again in September-October.

Grub (Remphan sp.).—Grubs damage roots of Erythrina live standards and Teak poles. Apply 5.10% Aldrin D. P. around the base of freshly planted Erythrina or dead Teak poles as prophylaxis. Partially damaged standards can be protected by applying Phorate 10 G @ 20 gm. per standard around the base through slanting holes.

The Burrowing Nematode (Radopholus similis) and the Root knot Nematode (Meloidogyne incognita).—Attach the roots of pepper vine. The burrowing nematodes attack the feeder roots and feed in the cortical region, damage the root tissues and result in their decay and death. The root knot nematode causes galls on the feeder and first lateral roots. The nematodes attack the vines singly or combined.

The vines show cessation of growth of tender shoots, leaves become flaccid as though due to moisture stress. The vines also exhibit decline (die-back) symptoms with drying and breaking off tender shoots at node region. Leaves show tip burn characteristics. Later, leaves turn yellow and start

shedding. In the initial stages yellowing of leaves may be occasional. When the attack of nematode is continuous and severe all the above symptoms are exhibited in a combined manner.

1. Use nematode free rooted cutting while raising new plantations.
2. For the infected vines apply one of the following nematicides. Phorate @ 1 gm. ai|vine, Carbofuran 1 gm-ai|vine or Aldicarb 10% G at 1 gm. ai|vine.

Apply the first dose during May-June at the onset of monsoon by raking soil around the vines near the root zone. Apply second dose during last week of October to first week of November. There should be enough moisture in the soil at the time of application of the pesticides. After applying the second dose, mulch the vines with dry leaves. Avoid collection of pepper berries for pickling after the second round of application of granules.

Ginger

Shoot Borer (Dichocrosis punctiferalis).—Caterpillar bores into shoot and kills it. Spray Dimethoate or Quinalphos at 0.05%.

Turmeric

Shoot Borer (Dichocrosis punctiferalis).—Larva bores into shoots. Spray 0.05% Dimethoate or 0.025% Quinalphos.

Cardamom

Cardamom Thrips (Taeniothrips cardamomi).—Thrips infest flowers, pods, tender leaves, leaf sheaths and pseudostem. Pods become malformed with scaby growth on them. Flower buds fall off, inflorescence becomes malformed and stunted Pod formation is reduced. As pest population is high during dry months from December to April pesticides application is important during this period. Three more spraying during August-November is recommended.

Spray any of the following.—Quinalphos, Fenthion, Phenthoate, Methyl Parathion, Formothion, Monocrotophos, at 0.03% or Phosalone, Fenitrothion, or Dimethoate at 0.05% concentration or any of the following dust formulations at monthly intervals.

Quinalphos 1.5% Methyl Parathion 2%, Phenthoate 4%, Carbaryl 10%, Phosalone 4% each at 25 kg|ha. First insecticide application is to be given during pre-monsoon periods followed by six more applications.

Cardamom Hairy Caterpillar (Eupterote sp.).—The large caterpillars defoliate plants. Spray 0.2% HCH. Hand pick and destroy caterpillars.

Cardamom Rhizome Weevil (Prodioctes Hocmaticus).—Grubs tunnel into rhizomes leading to secondary fungal infections.

Dust base of plants with BHC or Aldrin 5%.

Shoot Borer (Dichocrocis punctiferalis).—Caterpillar bores into shoot, pseudostem and pods. Spray 0.2% BHC or Carbaryl.

Nematode.—Methyl bromide fumigation in primary nursery Apply Aldicarb 10% G at the rate of 60 gm|6 sq.m. (10 kg|ai|ha) in the secondary nursery.

Cocoa

Red Borer (Zeuzera coffeae).—Larvae burrow into the main stem of young plants and fan shoots of older trees, causing drying up.

Prune off and burn affected fan shoots. Spray BHC 0.1% on the main stem of young plants as a prophylactic measure. The pods are damaged by sucking insect belonging to Helopeltis. Spray Endosulfan 0.05%.

Striped Squirrel (Funambulus sp.).—The squirrels gnaw the bronzing pods and extract the beans with mucilagenous pulp.

Harvest the crop just when bronzing is visible in the pod furrows. Mechanical protection of the pods ensured by covering them with punched polythene bags (150 gauge) smeared with bitumen kerosene mixture.

Rats (Rattas rattus).—Rats are serious in densely planted coconut gardens with cocoa as inter crop. They inhabit the coconut palm crowns and descend during night and cause damage to pods. Nature of damage is similar to that caused by Squirrels. Tie Fumarin bars (rain proof) on the base of an inner frond. Set up bamboo traps with bow attachment on the crown.

Myllocerus Weevil (Myllocerus viridanus).—Adults skeletonise the foliage. Serious in young plants during July to September.

Spray under surfaces of the foliage with Fenitrothion 0.05%, Quinalphos 0.025% or Fenthion 0.05%. Insecticidal protection is particularly essential for the young plants.

Mealy Bugs (Planococcus citri & Rastrococcus sp.).—The bugs occur in cherrelles, developing pods and shoots and desap the tissues. Can be controlled by spot application of Quinalphos 0.025% or Phosalone 0.1%.

Aphids (Toxoptera aurantii).—Colonies of pink aphids occur ventrally on the leaves of chupon shoot. Tender shoots are also damaged.

Nip off the flaccid leaves along with the shoots and destroy the colonies.

Cock Chafer Beetle (Popillia & Leucopholis).—Grubs feed on the roots of freshly planted seedlings causing wilting. Apply BHC 10% DP at 10 gm. per pit around freshly planted seedlings.

Nutmeg

The Hard Scale (Sessetia nigra).—Occur on the pencil thick branches and they desap the tissues. The infested shoots invariably develop sooty mould cover. Can be controlled by spot spraying with Quinalphos at 0.025%.

Clove

Shoot Borer (Senoxylon sp.).—Attack tender shoots and young plants. Prophylactic application of Carbaryl 0.15% or BHC 0.1%. Prune off the laterals of older trees showing die-back symptoms.

VIII. C Activities of the Agricultural Department and other Agencies

The Agriculture Department has been carrying on manifold activities for the promotion of agriculture. The distribution of improved varieties of seed and planting materials is one of the important items of work done by the Department. In the Departmentally run Agricultural farms (which are 34 seed farms, 9 District Agricultural farms and 50 other farms)

scattered all over the State, seed planting material and other agricultural inputs are sold. The extension machinery of the Department has all along been pursuing a selective crop-oriented approach confined mainly to crops like paddy, coconut, pepper and sugarcane. Farmers growing different crops have to approach different sources for technical know-how and other services. The Agricultural extension machinery is being re-organised to cover all the farm holdings and farming community on an area-wise basis. The Kerala Agricultural Extension project based on the training and visit system of extension drawn by the World Bank is intended for this purpose.

The reorganised Agricultural Extension System popularly called Training and Visit System of Extension is being implemented in Kerala with World Bank assistance. This Kerala Agricultural Extension Project commenced initially in three Districts in 1981. It envisages the transfer of proven technology to selected Contact Farmers in groups of 100-150 farm families by Agricultural Demonstrators (Village Extension Workers) through systematic and regular visits every fortnight. The entire state is covered by the programme now.

The State has been delimited to 378 Agricultural Extension Units each with a Junior Agricultural Officer (Agricultural Extension Officer). Based on population density, cropping intensity, accessibility and local conditions, each unit will have 5 to 8 Circles managed each by an Agricultural Demonstrator (Village Extension Worker). 1000-1200 farm families in each circle will be divided into 8 Groups each within 120-150 families. Agricultural Demonstrator visits 10 selected Contact Farmers in each group on a fixed day of the week in a two weeks cycle. Production messages for important crops of the area for a period of a fortnight are passed on to the contact farmers during these visits. The Junior Agricultural Officers supervise the work of Agricultural Demonstrators by visiting these groups in 4 days in a week in turn. Both Agricultural Demonstrators and Junior Agricultural Officers of Extension Units are full time extension workers free of all other administrative and technical responsibilites. They do not have a regular office too.

Training is an integral part of the system. At district level there is a monthly workshop for 2 days in every 28 days wherein production messages are formulated for 2 fortnights. Resource persons are Senior Scientists from Agricultural

University, ICAR Stations, and Commodity Boards, while subject matter Specialists of Districts, sub-divisions and Principal Agricultural Officers and Sub-Divisional Agricultural Officers are the participants. Every fortnight, the Sub-Divisional Agricultural Officer with Subject Matter Specialists of the Sub Division give one day training to Agricultural Demonstrators and Junior Agricultural officers on messages of one fortnight Junior Agricultural Officers in turn give training to their respective Agricultural Demonstrators one day in a fortnight. The regular prefixed training programmes provides plenty of opportunities for feed back of extension problems to research and thereby have an effective linkage with research.

Kerala Agricultural Development Project

The Kerala Agricultural Development Project is the first World Bank Project to be implemented in Kerala in the agricultural sector from 1977-78. The Project has as its main objective, the improvement in productivity of major foreign exchange earning tree crops and pepper with emphasis on improving the economic status of the small holder farmer. The Project comprise the following programmes:

1. New planting of coconut in 5000 ha. in Cannanore and Malappuram Districts;
2. Rehabilitation of coconut, including replanting of senile and unproductive trees in 30,000 ha. in areas free of root (wilt) disease in Cannanore, Kozhikode, and Malappuram Districts;
3. Provision of minor irrigation facilities in project coconut areas: 1000 ha. in new planting areas and 7500 ha. in rehabilitation areas;
4. Intercropping in coconut areas-26,500 ha. of various garden crops in areas without irrigation; about 3000 ha. of cocoa; about 3000 ha. of fodder for dairy cattle; about 2500 ha. of other crops in areas with irrigation;
5. Rehabilitation, including replanting of pepper in 10,000 ha. in Cannanore, Idukki and Kottayam Districts;
6. Rehabilitation of a State-owned cashew plantation of 2280 ha. and new planting of 1470 ha. in Cannanore District;
7. Establishment of a Seed Garden Complex in about 435 ha. for coconut, cashew, cocoa and spices;

8. Establishment of ten crumb rubber factories (nine new and one expansion), each of 10 ton|day capacity;
9. Strengthening of research by CPCRI, KAU AND IRB and training and technical assistance; and
10. Provision of improved extension services and investment credit facilities for project participants.

The Project would benefit 75,000 families in the districts of Cannanore, Kozhikode, Malappuram, Trivandrum, Kottayam and Idukki. It is expected to increase output on 45,000 hectares of small holding. At full production the incremental output would be about 200 million coconuts, 6,000 tonnes pepper, 15,000 tonnes milk, 2,000 tonnes cocoa, 6,000 tonnes cashew and 37,000 tonnes of other food crops. Rubber processing facilities would improve the quality of rubber products by 50,000 small holders into higher value technically specified rubber.

The Project cost spread over a period of 7 years is Rs. 62.10 crores. The World Bank credit for the Project is Rs. 27 crores. The balance cost would be met by the Government of India, Government of Kerala, NABARD, Lending Banks and other participating agencies and small holder farmers.

Multi-State Cashew Development Project

With the intention of bringing additional area under the cultivation of Cashew in Kerala, a Cashew Development Project is being implemented in the State from 1980-81, as a part of Multi-State Cashew Development Project to be implemented in the States of Kerala, Karnataka, Andhra Pradesh and Orissa, with financial assistance from the World Bank.

The Project for Kerala consists of three component programmes.

1. *Small Holder Component.*—Under this programme 10,000 hectares distributed in the Revenue Districts of Cannanore, Malappuram, Kozhikode, Wynad and Palghat will be additionally brought under Cashew cultivation in the course of 5 years starting from 1980-81. Small holder cultivators having an area of upto two hectares will be given financial assistance by way of long term loan and subsidy for cultivation of cashew in additional areas.

2. *Public Sector Plantation Component.*—An additional area of 2275 hectares is proposed to be brought under cashew

cultivation under the public sector, by the Plantation Corporation of Kerala Ltd., in the vested forests to be handed over for the purpose from the Revenue Districts of Kozhikode, Nilambur and Palghat Special Forest Divisions.

3. *Road Component Programme.*—Improvement of roads in the cashew growing areas of Cannanore, Kozhikode, Malappuram and Palghat Districts to facilitate transportation of inputs, and produces forms one of the components programme of the project. 180 km. length of roads are proposed to be improved with World Bank finance under the Project.

Kerala State Land Use Board

The State Land Use Board was constituted on April, 14, 1975 charged with the responsibility to keep a continuous watch on the land management problems of the State.

The main objective of the Board are:

1. Collect and collate data on land resources and land use;
2. Undertake surveys on current land resources;
3. Initiate studies on appropriate land use and related aspects;
4. Recommend policy frame work to help Government to arrive at correct decisions on the land use; and
5. To monitor and co-ordinate the implementation of the decisions of the Government related to land use without displacing the existing agencies.

The Board was reconstituted on 16th May, 1984 with the Chief Secretary as Chairman, Commissioner for Economic Development as Vice-Chairman and the Land Use Commissioner as Member-Secretary. There are seven other Members in the Board.

The Board has so far prepared 25 reports on land use and allied topics. Three major projects viz. Land Use Survey of Idukki District using remote sensing techniques in collaboration with the Space Applications Centre, Ahmedabad, Reconnaisance Soil Conservation Survey of Quilon District, Identification of priority areas for Soil Conservation in Trivandrum District have been completed.

A Data Bank has been set up in the Board to collect and collate data and maps on land resources and land use. Aerial

survey maps of Kerala State were stored in the Data Bank. Soil Survey Maps, Grouped Survey Maps, data on Irrigation Projects were also stored in the Data Bank.

A Photo-interpretation Laboratory with the required equipments has been set up in the Board to interpret aerial photos and 'Land Sat' imageries.

The present programme of the Board is to prepare an optimum land use plan for the northern Districts of Kerala using remote sensing techniques.

In collaboration with the Department of Space, the Board has established a User Cell Agency under the National Natural Resources Management System (NNRMS) for making available all the remotely sensed data under the Indian Remote Sensing Satellite-User Programme and other programmes to the different departments and institutions in the State.

The Board had proposed two projects utilising the imageries available from the Indo-Soviet manned Space flights-RSE|TERRA experiments.

1. Inventory of forest resources of Kerala using the multiband photographs from RSE|TERRA.
2. Delineation of the soil types of Kerala using the data from RSE|TERRA.

Both these schemes have been accepted by the Space Applications Centre, Ahamedabad and they have agreed to provide the imageries and to collaborate with the Board in their interpretation and mapping.

In collaboration with the National Remote Sensing Agency, Hyderabad the Board has finalised a project of covering the entire State by aerial photography in a phased manner. The aerial flights for the photography will be undertaken by the NRSA and they will make available to the Board both black and white and colour infra-red photographs in 1:15,000 scale. These photographs will be interpreted and mapped at the Laboratory of the Board.

The Board has also proposed to modernise on scientific lines the existing photo-interpretation laboratory and cartographic cell with upto date equipments and instruments.

Centre for Water Resource Development and Management

The Centre for Water Resources Development and Management (CWRDM) is an autonomous research institution established by the Government of Kerala in 1978, under the Science and Technology Programme. The main objective of CWRDM is to conduct research and studies on the assessment, conservation, development and utilisation of water resources. CWRDM is envisaged to function as centre of excellence for advanced research, training and extension on all aspects of water resources. It will also act as an advisory functional institution in the planting and execution of national projects of water use. CWRDM is organised into scientific technical and administrative wings.

At Present CWRDM has around 75 research projects at hand including, collection and documentation of hydrologic data to Kerala, scientific assessment of surface water potential of Kuttiyadi River Basin, open well projects which aims to create an extensive data base on both the quantitative as well as qualitative aspects of ground water exploitation, study of utilising laterites for pollution control, biogas generation from aquatic weeds, studies on moisture conservation techniques for upland crops of Kerala, studies on watershed management, studies on water pollution in Kuttanad area, operational research project on modernising the command area of Kuttiyadi irrigation Project etc.

CWRDM is regularly conducting seminars, work-shops, training courses etc., on various aspects of water technology.

Apart from the funds made available by the Government of Kerala, CWRDM is getting financial and other support from National Agencies like, Departments of Environment, Science and Technology and Ocean Development and Indian Council of Agricultural Research, Indian Space Research Organisation, Central Board of Irrigation and Power, National Remote Sensing Agency, National Water Development Authority, Bhaba Atomic Research Centre, and from International Agencies like, British Council, Commonwealth Foundation, UNESCO, Government of Japan, National Academy of Sciences (USA), Institute of Hydrology (UK) Birmingham University, Lousiana State University, Liverpool University etc.

Headquarters of this Institution is at Kottamparamba. situated 13 km. east of Calicut.

Command Area Development Scheme

The Command Area Development Programme aims to bridge the gap between the irrigation potential created and utilised so far. The primary objective of Command Area Development Scheme is to ensure efficient and scientific water management at all levels by optimising the use of water and land and thereby maximise agriculture production per unit of water consumed and land irrigated. The scheme envisages to convert the present irrigation projects into water use projects.

Command Area Development Programme envisages inter alia construction of field channels from spouts to individual holdings to assure equitable distribution of water within the entire command area.

Projects included in the Command Area Development Programme of the State are Malampuzha, Walayar, Gayatri, Pothundi and Mangalam, in Palghat District, Vazhani, Cheerakuzhi and Peechi in Trichur District, Chalakudy in Trichur and Ernakulam Districts and Neyyar in Trivandrum District, covering a gross culturable command area of 86124 ha.

The following are the activities envisaged in the State in Command Area Development Programme.

1. On-Farm Development works and necessary machinery for efficient water management namely construction of field channels, drainage channels, introduction of warabandi, formation of Water Users Associations.
2. Application of scientific agricultural practices viz. soil survey, introduction of new cropping patterns, supply of agricultural production inputs and providing services including credit.
3. Development of water management and crop production adaptive trials.
4. Training of personnel involved in water distribution, water management and crop production.
5. Farmers training.
6. Survey and monitoring.

CADA has drafted a Command Area Development Bill for implementation of the CAD programme. In view of the anticipated delay in passing the Bill, Government had ordered the implementation of the Command Area Development Schemes

using the provisions of the Kerala Land Development Act of 1964. Schemes for construction of field channels are being processed using the provisions of Kerala Land Development Act.

Kerala State Coconut Development Corporation Ltd.

The Kerala State Coconut Development Corporation Ltd., was registered in 1975 under the Companies Act, 1956 with its Registered Office in Trivandrum. The authorised Share Capital of this fully owned Government Company is Rs. 5 crores. Providing technical facilities for developing coconut industry, particularly for the development and modernisation of production, processing and marketing coconuts and its derivatives are the main objectives of this Corporation.

The Project Report approved by the Government envisages establishment of two integrated Coconut Processing Complexes each having a crushing capacity to crush 60 MT. of copra per day, one in the southern part and the other in the northern part of Kerala. Of these, the southern complex has already been established at Attingal (Mamom) in Trivandrum district, and has started commercial production during October, 1980. The present crushing capacity is between 40-45 Mt. of copra per day. The second Integrated Coconut processing Complex, at Thiruvangoor in Kozhikode district, with a crushing capacity of 18,000 MT. of copra per year, is operating since March, 1984.

The Corporation is marketing coconut oil under the brand name 'KERAGEM' in small packs viz., 4 kg. 1000 ml. 750 ml. 500 ml. and 250/200 ml. apart from bulk sales. The Corporation is selling oil mainly in up—country markets especially in Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra States.

The Plantation Corporation of Kerala Ltd.

The Plantation Corporation of Kerala Ltd., was registered on 12-11-1962 as a Joint Stock Company with an Authorised Share Capital of Rs. 750 lakhs. This is the largest Public Sector undertaking cultivating Cashew and Rubber. There are 7 Rubber estates and 4 Cashew estates under the Corporation. Over and above this the management of Alakode estate is vested with the Corporation. The total area under rubber is 7300 hectares, out of which 6200 hectares are mature. The total area under Cashew is 6020 hectares. Cashew cultivation is

being extended in Kasaragode and Palghat districts under the World Bank assistance replanting the entire rubber plantation with high yielding clones by 2000 AD on a phased programme has been drawn up and is being implemented.

The crop received from the estates is processed into centrifuged latex, various grades of sheets, Crepe and Crumb rubber in their factories established in various estates.

The Corporation is providing employment to 7000 persons and all the employees are given free quarters and medical and educational facilities are provided for the dependents and children.

Kerala Agro-Machinery Corporation Ltd.

Kerala Agro-Machinery Corporation came into existence on 18-4-1983 as a fully owned subsidiary of Kerala Agro-Industries Corporation Ltd., a Government owned Company. The main objective of the company is the manufacture and sale of agricultural machinery|implements to increase agricultural productivity. The Corporation is licenced to produce 12000 Nos. of KAMCO Power Tiller of 12 HP and 5000 Nos. each of 5 HP and 8 HP Diesel Engines per year in collaboration with the world famous M|s. KUBOTA Ltd., the pioneers in agricultural machinery manufacturing field.

KAMCO is the only Public Sector Undertaking in the Country manufacturing Power Tillers. It supports a labour force of about 300 directly and another about 8,000 indirectly through ancilliary development in Kerala as well as other parts of the Country.

KAMCO has produced and sold 9000 and odd Power Tillers so far throughout India and even has successfully executed an export order worth Rs. 20 lakhs.

Marketfed

The Kerala State Co-operative Marketing Federation came into existence in 1960 as an Apex Body of Primary Marketing Societies in Kerala. MARKETFED is now engaged in the marketing of agricultural produce like Black Pepper, Cardamom, Ginger, Cloves, Turmeric, Cinnamon, Copra and all Fertilizers and Pesticides of reputed manufacturer in Public|Private sectors.

The Federation entered the Spices export trade in the year 1966. From the year 1976 onwards Marketfed could

emerge as one of the top—most exporters of Indian Spices and during the subsequent years awards for the topmost exporters of Pepper were conferred on the Federation. Due to the continuous activity in the field of spices marketing the Federation is in a position to control the spices market in Kerala and thereby it could provide better prices for the products brought by the farmers.

Coconut Development Board

The Coconut Development Board came into being on the 12th of January, 1981 for the overall development of coconut cultivation and industry in India. The Board functions under the administrative control of the Ministry of Agriculture, Government of India. It has its headquarters at Cochin in Kerala State and a regional office at Bangalore.

The following projects are being implemented by the Board in various coconut growing states in the country. 1. Project for the expansion of area under coconut, 2. Project for production of quality coconut seedlings, 3. Project for Coconut Plantation on canal embankments in Orissa State, 4. Project for the establishment of Hybrid Seed Garden and Pilot Hybrid Testing Centres in Tamil Nadu, 5. Project for the establishment of a Coconut Technology Development Centre, 6. Project for the establishment of Coconut Grower's Co-operatives|Oraganisations for promoting primary processing and marketing activities, and 7. Project for providing financial assistance to coconut growers for the removal of root (wilt) affected coconut palms in Kerala State.

Coffee Board

The Coffee Board was constituted by Government of India for the overall development of Coffee Industry in the Country with the following functions:—

1. Promotion of the sale and consumption in India and elsewhere the coffee produced in India.
2. The promotion of agricultural and technological research in the interest of the coffee industry.
3. Assistance to coffee estates for their development.
4. The securing of better working conditions and the provision and improvement of amenities and incentives for workers, and

5. The working of the measures enumerated in the Coffee Act relating to operations of the surplus pool.

Coffee Board has two Regional Research Stations, one exclusively for Robusta research in Kalpetta, Wynad District. There are Coffee Demonstration Farms in Manantody, Kalpetta.

The monthly journal 'Indian Coffee' is published by the Propaganda Department in English, Kannada, Tamil and Malayalam. The Research Department of the Coffee Board has its main Research and Training Centre at Central Coffee Research Institute at Balehonur in Chickmagalur District in Karnataka and has two Regional Research Stations one exclusively for Robusta research in Kalpetta, Wynad District, Kerala and another at Raghavendra Nagar, Chintapalli, Andhra Pradesh. The third Regional Research Station is likely to come up in Pulney Hills of Tamil Nadu and the fourth one in Diphu in Assam.

The Extension Department which caters to the needs of planting community in general has 51 offices in all over the traditional coffee areas of Karnataka, Kerala and Tamil Nadu manned by five Dy. Directors, 13 Senior Liaison Officers and rest Liaison Officers. They are assisted by Liaison and Field Assistants. There are Coffee Demonstration Farms in Chickmagalur, Mudigere, Saklespur, Gonicoppal in Karnataka, Manantody, Kalpetta in Kerala, Perumparai, Yercaud and Bodinayakanur in Tamil Nadu, Minimulur in Andhra, Koraput in Orissa, Haflong in Assam, Kohima in Nagaland, Deomali in Arunachal Pradesh and No-ne in Manipur. There is a Regional office of the Coffee Board in Gauhati in Assam.

Tea Board

The Tea Board, a Body Corporate was established under the Tea Act, 1953 to promote the development of Tea Industry under the control of the Central Government.

The functions of the Board are: to promote the development of the tea industry for which specific measures are to be taken regarding regulation of production and extent of cultivaion of tea, improvement of quality, promotion of cooperative efforts amongst growers and manufacturers, undertaking, assisting or encouraging scientific, technological and economic research and maintaining or assisting in the maintenance of demonstration farms and manufacturing stations, assisting in the control of insects and other pests and diseases

affecting tea, regulation of sale and export, training in tea tasting, increasing the consumption of Tea in foreign countries and carrying on propaganda for that purpose; registering and licensing of manufacturers, brokers, tea waste dealers and persons engaged in the business of blending tea; improving the marketing of Tea in India and elsewhere, collecting statistics from growers, manufacturers, dealers and such other persons as may be prescribed on any matter relating to the tea thereof or extracts therefrom; securing better working conditions and the provisions and improvement of amenities and incentives for workers and such other matters as may be prescribed.

The Board has Regional/Sub-regional Offices located at Cochin and Kottayam.

The Rubber Board

The Rubber Board is a statutory body working under the Ministry of Commerce, Government of India. The important function of the Rubber Board is to promote by "Such measures as it thinks fit" for the development of the Rubber industry in India. The Rubber Research Institute of India which has celebrated its Silver Jubilee in November 1980 is undertaking comprehensive and co-ordinated research work on all aspects of natural rubber cultivation and processing.

The Rubber Production Department is responsible for licensing and registration of rubber estates, implementation of various development and extension service schemes, carrying out economic research and management of rubber plantation projects in Andamans and Nicobar Islands.

The Department of Rubber Processing was established in 1977 for the implementation of the Rubber Processing Component of the Kerala Agricultural Development Project. The Department is financed by the International Development Association of the World Bank.

The Cardamom Board

The Cardamom Board was constituted by the Government of India for the all round development of Small Cardamom (Elettaria cardamom) cultivated mainly in Kerala, Karnataka and Tamil Nadu States, and Large Cardamom (Amomum subulatum) cultivated in Sikkim, West Bengal and Assam.

The Head Office of the Board is located at Cochin, Kerala State. The Board has got one Regional Office in Sikkim and three Zonal Offices in Kerala, Karnataka and Tamil Nadu.

Central Plant Protection Station

The Central Plant Protection Station, Ernakulam was established in 1965, along with thirteen others deployed over various States of the Indian Union, under the plan scheme called "Central Pool of Plant Protection Equipment". The aim of the scheme was to render assistance to the State Department of Agriculture in organizing compaigns against Pest and Disease epidemics of crops.

The Central Plant Protection Station also provides ground support whenever aerial operations against crop pests and plant diseases are organized.

Schemes for the study of pest infestation in storage and remedial measures are also attached to the Central Plant Protection Station, Ernakulam.

Central Plantation Crops Research Institute

The Institute was established in 1970 by merging the erstwhile Central Coconut Research Station at Kasaragod and the Central Arecanut Research Stations. At present, with its headquarters at Kasaragod, the Institute has three Regional Stations one each at Vital, Kayamkulam and Calicut and two ICAR-Research Complexes at Goa and Lakshadweep.

Besides conducting and guiding research on plantation crops, the Institute co-ordinates the research works on plantation crops done by other institutes, Universities and State Departments of Agriculture. The Institute also serves as a Centre of information in the Country on all matters relating to plantation crops. Apart from serving the All India Co-ordinated Projects on coconut and arecanut and on spices and cashewnut, the Institute imparts training on the latest agro-techniques of plantation crops to scientific and extension personnel from India and abroad and also to farmers.

The Institute carries out research work on coconut, arecanut, cashew, cocoa, oilpalm, pepper, cardamom, ginger, turmeric, cinnamon, nutmeg, clove and all spice. Problems in each crop are identified and formulated into time-targeted projects.

The Institute has taken up two out-reach programmes: (i) Operational Research aims at all round development of a Village with emphasis on garden land management and development, (2) ICAR Lab. to Land Programme (Phase II which aims to cover 75,000 farm families all over the country).

The Institute has established a World Coconut Germplasm Centre in Andamans and is also associated with the Research on coconut and pepper under Kerala Agricultural Development Programme and Research on cashewnut under Multi State Cashew Project supported by World Bank.

Central Tuber Crops Research Institute

The Central Tuber Crops Research Institute, Trivandrum was established in 1963 for conducting and co-ordinating research on all the tuber crops (other than potato) and to act as an information centre on them.

The highlights of the work carried out so far are:

1. Collection, evaluation and cataloguing of germplasm of various tuber crops; so far over 2,900 accessions have been assembled.
2. Development of package of practices for various tuber crops.
3. Evaluation of several improved varieties of the various tuber crops. These include H-97, H-165, H-226, H-1687 (Sree Visakham), H-2304 (Sree Sahya) in Cassava; H-41, H-42, H-268 and OP-2 in Sweet Potato: De-II De-17, D-23 in Lesser yams; Da-60, Da-80 and Da-122 in Greater yams; C-9, C-135 and Kovvur in Colocasia and Xa-40 in Xanthosoma.

The Process Engineering Unit of the Institute has fabricated a proto-type of manually operated cassava chipping machine. About 60 kg. of Cassava tubers can be made into chips per hour as against 24 kg.|hr. in hand slicing. The approximate cost of the machine works out to be Rs. 900.

The Kerala Agricultural University

The Kerala Agricultural University came into existence with effect from 24th February 1971 under the Kerala Agricultural University Act, 1971 (Act 33 of 1971). Before the establishment of the University all research education and training programmes connected with agricultural production were in the

hands of the department of Agriculture. With the coming into being of the University, research education and extension became the major responsibilities vested with it. Thus the college of Agriculture, Vellayani, along with 21 Agricultural and Animal Sciences Research stations were transferred to the Kerala Agricultural University.

The main campus of the University is located at Vellanikkara. The University also has four other teaching campuses at Mannuthy, Panangad, Vellayani and Thavanur. As nearly two thirds of the cultivated area in the State are under horticultural and plantation crops, the need was felt for strengthening horticultural education and research. Hence a Horticultural College was established in October 1972. The College of Agriculture, Vellayani (11 km. from Trivandrum) was started in the year 1955 with the object of imparting scientific agricultural education leading to the Bachelor's Degree in Agriculture.

The Rural Institute, Thavanur was taken over by the University in 1975 which later metamorphosed into the Kelappaji College of Agricultural Engineering and Technology.

The research programmes of the University have been drawn with emphasis on solving location specific, farm oriented problems encountered by the farming community of Kerala. The research projects under the National Agricultural Research Project have been formulated giving stress for overcoming the local constraints to agricultural production. Studies of basic and fundamental nature are mainly taken up by the Departments of the constituent colleges of the University as departmental investigations and under post-graduate programmes. Problem-oriented research of applied nature is conducted in the various Research Stations of the University and through specific research project|schemes operated in the different agro-climatic zones of the State. Adaptive research is also undertaken for evaluation and refinement of newly developed technology under farmer's field conditions for ensuring acceptance at the beneficiary level. Under the village adoption programme the University provides leadership for the over all development of the adopted villages. The programme aims at building up close relationship between the University and the farming community to transfer the recently developed technologies to the farmers and at getting feed back of field problems to the University scientists for finding solutions.

The extension organisation of the Kerala Agricultural University places accent on training of active farmers as well as prospective youth who wish to pursue self-employment vocations in rural areas. Training programmes and study tours for farmers have been organised in the research stations of the University. The farm advisory service of the University enables farmers to solve the problems, as well as providing exposure to the specialists, Information support is provided to the farmers through "Agricultural Science News Bulletin" and talks organised by the All India Radio and Doordarshan, wherein the research findings are highlighted. Families selected under the lab to land programme are provided with input assistance.

The University has been successful in releasing new rice varieties for cultivation, suited to the various agroclimatic regions in the State. Besides a new variety of cashew, new technologies have been generated for adoption in the State by the University.

Animal Husbandry and Fisheries

(i) *Area under fodder crops.*—Increase in the productivity of livestock has been hampered by a shortage of feed and fodder. In olden days it was customary to let the cattle to graze on the hill slope and plains. The area shown under the permanent pastures and grazing lands in the State comes to 5,222 hectares which forms only 0.11% of the cultivated area. This is not capable of supporting more than a small fraction of the livestock population. It is also doubtful whether all this area is actually utilised for feeding the cattle. Most of these lands are used for cultivation to meet the demands of the growing population. What is normally done is to feed the cattle on the weeds growing on cultivated land, the grasses on the field borders and along water channels and sheaves of crops. Stress is laid on developing fodder resources under the Intensive Cattle Development Project. Good quality of fodder crops and roots|steps of perennial grass are being distributed for cultivation purposes. Besides fodder cultivation demonstrations are also organised. High yielding fodder grasses like Guinea grass, Hybrid Napier, Napier, Para Grass, Teosinte and Cowpea, are found acceptable to the farmers. Planting materials are being distributed free of cost to the farmers to lay out perennial grass cover as inter crop in coconut garden. Intensive efforts are underway to bring a

substantial portion of the cropped land under fodder grass cultivation. Increased production and availability of fodder at a low price is a necessary condition to bring down the cost of production of milk, which is higher than in any part of India on account of the high cost of feed. Almost three fourth of the feed concentrate is brought from outside the State. With such supply becoming uneconomical, cultivation of legumes varieties with protein content such as cultivation of legumes like cowpea in paddy lands as third crop assumes relevance. More areas of the coconut gardens could be brought under fodder as inter crop. The straw could be enriched by addition of urea and molasses. Sugarcane tops and Pineapple waste are good and economical source of fodder crops. Similarly there is extensive scope for planting fodder trees like Subabul particularly in waste lands and boundaries.

(ii) *Dairy farming.*—Milk is obtained from cattle, buffaloes and goats in Kerala. As per 1982 livestock census, there were 30.97 lakh cattle, 4.09 lakh buffaloes and 20.04 lakh goats in the State. The growth of livestock population as revealed by Livestock Census from 1966 to 1982 is given below:

GROWTH OF LIVESTOCK POPULATION IN KERALA

Category	1966	1972	1977	1982
Cattle	2,856,727	2,856,320	3,006,059	3,096,775
Buffaloes	471,747	471,747	454,400	408,584
Goats	1,189,218	1,467,657	1,683,297	2,003,795
Sheep	11,519	10,321	2,546	7,059
Horses & Ponies	426	457	90	72
Donkeys	310	861	266	370
Camels	4	11	..	4
Pigs	111,928	129,087	172,375	127,147
Total livestock	4,641,375	4,936,469	5,319,033	5,644,580
Fowls	9,587,286	1,183,598	13,056,186	14,519,039
Ducks	318,751	361,941	429,569	530,354
Others	2,958	979	3,095	34,017
Total poultry	9,908,995	1,546,518	13,488,850	15,083,410

Source: Livestock Census Report.

The bulk of milch animals are concentrated in rural areas owned by farmers and agricultural labourers. Various livestock and dairy development programmes are being implemented by the Animal Husbandry and Dairy Development Departments and by the Kerala Livestock Development and Milk Marketing Board and the Kerala Co-operative Milk Marketing Federation. They are primarily concentrating on the enhancement of per capita income and employment opportunities of the weaker sections of the society.

Of the total cattle, 9.64 lakhs are cows in milk. The cows produce 84% of the milk. As a consequence of the cross breeding programme nearly 56% of the local *(desi)* breedable cows have been converted into cross breed and this paved the way for increase in the milk production in the State. The average milk yield of cross breed cows is 3.95 kg. per day and that the *desi* cow 1.69 kg. per day. The milk production in 1984-85 was estimated at 12.20 lakh tonnes as against 11.50 lakh tonnes, in 1983-84 and this registered a growth rate of 6.07 per cent over the previous year. The per capita requirement of milk as estimated by Dr. Sukhatme is 201 gm. per day but the availability during 1984-85 was only 122 gms. per day. In 1984-85 the total milk production in India was estimated at 384.4 lakh tonnes and the State's share of all India production was 3.17%. The per capita production of milk in Kerala is estimated at 43.5 kg. which is far below the all India level of 52.4 kg. The average yield from cattle is low. The inadequacy in the quality of stocks, insufficient feed and fodder and the high mortality rate among female calves etc., are responsible for the low yield from cattle. The indigenous breeds stand no comparison with exotic cow breeds. The difference in milk yield is normally 1:20. Milk production is being enhanced increasing the number of cross breed cows and herd improvement through scientific management and feeding of improved stock. Dairying as full time occupation has restricted scope in the State relevant only in suburban areas which have ready markets. However in rural areas dairying can become part of an integrated farming system.

The annual milk production from buffaloe works to 8% of total milk production. The number of buffaloes yielding milk as per 1982 census is 82.7 thousand out of a breedable stock of 137.3 thousand. The average milk production of buffaloes has been estimated as 3.17 kg. per day. The potential for

developing buffaloe as a source of meat is very high. The male calves could be quickly grown on coarse fodder for production of high quality meat. The meat production in the State has gone up from 18,652 MT. to 22,505 MT. during 1984-85.

The number of male goats is 127.4 thousand and female goats 1,038 thousand as per 1982 census. On an average 6 lakh goats are slaughtered annually in the State yielding 4,200 tonnes of meat (1982). The annual milk production from goats is estimated at 98,000 M.T. in 1984 which works out to 7.8% of total milk production. A goat farm at Komeri (Cannanore District) intended for taking up studies on selective breeding of indigenous goats and for evolving a good milch strain of Malabari goat has been set up. Goat development is one of the promising fields for generating employment opportunities in rural areas. It has been estimated that a unit of 10 to 15 goats can provide full employment to a person. There were 545 cattle improvement units in 1984 and they carried out 3.54 lakh artificial inseminations and 66,902 calves were born of which 34,440 were females.

(iii) *Pig Development*.—Scientific pig rearing was launched in the State in early sixties. It was in the year 1964-65 that the Government of India conceived special development programmes for increasing the availability some of the essential food commodities such as meat, milk, eggs, fish, fruits and vegetables etc. Without an active programme for increasing the availability of some of the essential subsidiary foods, it would have been impossible to find relief from the overall food shortage in the country as a whole. The need to improve the nutritional standard of the diet of the common people to safeguard their well being was also another immediate consideration. One of the programmes recommended for adoption under special development assistance was the establishment of pig breeding Farm cum Bacon Factory. The pig is probably the world's most prolific feed producer. Pork like all lean meats, is an important source of high quality protein and provides a considerable amount of iron and niacin. Pork is also specially important for thiamine. A 100 gm. serving of cooked pork provides about one fourth of the protein and iron, almost one half of the thiamine and two fifths of the niacin equivalent recommended as daily allowance for a young male adult. A pig breeding farm was started at Mannuthy (Trichur district)

with a foundation stock of 100 sows and 10 boars of large white Yorkshire breed for multiplication and distribution of sufficient number of pure breed piglings. Subsequently seven pig breeding units were added. A Bacon factory was commissioned at Koothattukulam (December 1966), where pigs are distributed to farmers for breeding and fattening. The technical know-how for the establishment of the Factory was made available by the F. A. O. The Bacon factory is now managed by a public sector company, Meat Products of India. High quality Bacon, ham and various sausages are produced from selected Yorkshire, land-race and other exotic breed of pigs weighing about 80-100 kg. The products are sold to consumers through an elaborate net work of agents.

The Department of Animal Husbandry is implementing the following pig development programmes.

(1) Establishment of Pig Breeding Farms.

(2) Intensive Pig Development Project.

(3) Expansion of Pig Breeding Unit; and

(4) Grading of local pigs.

The object of the first programme is to maintain pure bred stock of exotic breeds for breeding purpose. Cross breeding is adopted to produce hybrid piglets for purpose of distribution among farmers for fattening. Pure bred boars of high genetic potential are distributed amongst pig farmers of selected locality for grading of local pigs. Nucleus of breeding stock of Hampshire breed is maintained at Piggery sub unit Thalayolaparambu and of large white Yorkshire breed in other departmental units.

The second named programme aims adopting pig breeding on scientific lines, and involves granting of subsidy in the cost of piglings and grants for construction of pig styes to farmers.

There are five piggery sub units in the State under the Animal Husbandry Department. They are located at Parassala in Trivandrum District, Thalayaloparambu in Kottayam District, Angamaly in Ernakulam District, Kunnamkulam in Trichur and Mundayad in Cannanore District.

The last programme aims at increasing the genetic potential of desi pigs using exotic germ plasm.

(iv) *Poultry farming.*—Poultry production is done extensively as a backyard enterprise with rearing of low productive desi and high yielding improved strains of fowls. According to the 1982 census the poultry population is around 150 lakhs (comprising of fowls, ducks, turkeys and guinea fowls). The per capita availability of eggs per year is 49, and the total annual egg production was around 1,310 million in 1984-85. The demand for poultry products is on the increase. The Animal Husbandry Department is maintaining Regional Poultry Farms in the almost all districts to cater to the requirements of poultry farmers. Two Intensive Poultry Development Blocks are functioning at Pettah in Trivandrum and Muvattupuzha. The Department is also administering a Central Hatchery at Chengannur, to propagate improved methods of poultry rearing. Training is imparted in sexing of chicks, hatching of eggs, etc. The Hatchery runs a feed compounding factory which caters to the feed requirements of the Regional Poultry Farms, besides meeting local growers needs. A feed testing laboratory is also attached to the Hatchery engaged in quality control of feed materials. There is a Duck Farm at Niranam run under departmental auspices where exotic high yielding breeds of duck like white Pekinese and Khaki Campbell are cross bred with indigenous breeds to improve the progeny.

As stated, Kerala has been engaged traditionally in the back yard system of poultry rearing. Growing urbanisation and the dwindling size of land holding are likely disincentives to expanded poultry rearing activities. Notwithstanding these handicaps intensification of the traditional poultry rearing practices is possible through arranging quality inputs of chicks, feed, health cover and marketing. Towards this end veterinary institutions at the Panchayat level are distributing day old chicks|pullets|broilers, etc. At the rate of one lakh family in each district a total of 14 lakh families are additionally being exposed to poultry rearing. Each family can be supported with 10 pullets and other inputs.

To widen the present status it is proposed to make available profitable cheap and economic feed, co-operativisation of the marketing network. In the Five Year Plans it has been targeted to double the present per capita availability of eggs to 80 by raising the population to 50 lakh birds and production to 2,480 million eggs. This calls for improved breeding techniques improved feed and other management. The data presented below depicts the progress upto 1982.

During 1983-84, 7 regional poultry farms, 2 District poultry farms, one Central Hatchery, one Turkey fowl farm, and 2 intensive poultry development blocks functioned under the Animal Husbandry Department. In addition two mobile egg sales booths, one chick sexing school, one broiler farm and an avian disease diagnostic laboratory were departmentally managed. There is a duck rearing farm at Niranom near Tiruvalla.

TABLE

Poultry Development in Kerala

Sl. No.	*Item*	1956	1961	1966	1972	1977	1982
1.	Poultry population including ducks (in lakhs)	61.6	91.06	99.08	122.07	133.8	150.8
2.	Per capita availability of eggs	NA	NA	15	29	38	40
3.	Egg production (in Million)	..	..	286	..	943	1,016
4.	Chick production in Government farm	..	..	3.19	7.21	4.19	4.97
5.	No. of Poultry Co-operative Societies (Nos.)	..	..	16	18	3	1,300
6.	Broiler Production (lakhs.)	..	..	..	..	..	1.10

(v) *Animal Diseases and Veterinary Hospitals.*—Animal diseases are of various types in origin and behaviour. The chief endemic animal diseases are Rinder pest, foot and mouth disease, black anorter, piropiasmosis (Bovine) anthrax, haemmor

hagic septicaemia and rabies. The other diseases are *goats*—contagious respiratory diseases. *Pigs*—sevine fever. *Poultry diseases*—cocoidiosis, ranikhet, fowl pox worms, ectoparasites, aspergillosis, haemorrhagic disease and mackis disease, henkosis, infections coryza, fowl cholera, blow out, ecoti infection. There were 1,372 Veterinary Institutions in the State comprising of 42 polyclinics, 479 hospitals, 118 dispensaries, 12 mobile veterinary hospitals and 18 mobile farm aid units, in 1983-84. A Veterinary Biological Production complex is functioning at Palode in Trivandrum. About 33 lakh animals were treated against various diseases and vaccination|inoculation was conducted on 11.81 lakh livestock and 27.18 lakh poultry to prevent diseases|infection. The Veterinary Polyclinics established by the Animal Husbandry Department ensure a multi-disciplinary approach and provide domiciliary services to control various animal diseases. Besides Mobile Farm Aid Units have been set up to provide veterinary services and extension support to farmers in remote rural areas.

The crossbred animals are susceptible to diseases. So it is necessary to provide animal health support for the crossbred cattle population and other species of improved stock in the State. A multi-disciplinary approach in combating animal diseases will have to be introduced. Domiciliary animal health service should be made available to ensure timely veterinary aid in the intensive, areas of livestock production. Charges will have to be levied for specialised service and drugs. Disease investigation and control measures need strengthening. Disease free zones will have to be established in specific areas to promote the export potential of livestock products. The details are given below:

		1982-83	1984-85
1.	*Veterinary Institutions*		
	(i) Veterinary Polyclinics	35	42
	(ii) Veterinary Hospitals	426	479
	(i i) Veterinary Dispensaries	128	118
	(iv) Other Institutions	638	811
2.	Animal treated (lakhs)	34.11	33.96
3.	*Vaccinations and inoculations conducted (lakhs)*		
	(i) On livestock	9.15	11.95
	(ii) On poultry	26.18	38.27
4.	Antirabic vaccination done (Nos.)	35,307	22,435
5..	Cattle Insured (Nos.)	31,966	20,127

(vi) *Measures to improve quality of breeds etc.*—The cross breeding of cattle has made impressive progress in Kerala with the introduction of artificial insemination with deep frozen semen. The Indo Swiss Project, through its breeding policy for cattle breeding and implementation using frozen semen technology, has given a sound base for the successful launching of a State-wide cattle development programme in the late Sixties. Acting in concert, the Animal Husbandry Department, the Dairy Development Department and the Kerala Livestock Development and Milk Marketing Board, carried out more than 9 lakh inseminations every year, yielding about 30 to 35% calf crop. With such an intensive cattle breeding programme, Kerala is now producing more than 20% of the total cross-bred calves in India. Enhancement of the milk Yield potential of the present generation of cross-bred cattle can be attained only by the vertical enhancement through the process of selection and progeny testing. "The exotic inheritance is to be maintained at 50% and intermating with half bred bulls of proven merit through progeny testing and selection will be the pattern of future breeding programme". (Report of the Expert Committee Constituted for advising the Government on breeding). Increasing the number of cross bred cows without any substantial increase in the total breedable stock, gradually reducing the low yielding non-descript desi variety of cattle through an intensified programme of cross breeding is one of the ways. Cross bred cattle population could be increased by stepping up the tempo of artificial breeding programme. The existing arrangements can be re-oriented to provide inputs for breed improvement to farmers at the grass root level to adapt to modern technology. Progeny testing at field level is being implemented on a state wide basis for selection of breeding bulls. In order to have a reserve of germplasm of indigenous cattle for maintaining optimum blood level of locally adopted cattle in the cross bred progeny for heterosis adaptability, a drive has been initiated to preserve sufficiently large herd of local cattle in their pure state. Germplasm of indigenous goat, poultry, etc., is also to be preserved. The present lactation of 1500 litres with an inter calving period of 600 days could be doubled to 3,000 litres with an inter calving period of 400 days. To attain this superior germ plasm will be imported and the present bull station used to produce bulls of 50% of exotic inheritance of the superior germ plasm. These bulls will be utilised for intermating half bred female populations. The breeding programme is implemented using superior Hostein Genes.

Kerala Livestock Development and Milk Marketing Board

The cattle breeding is carried out by the Kerala Livestock Development and Milk Marketing Board in colloboration with the Swiss Government under the Indo-Swiss Project Agreement. The KLD and MM Board makes available frozen semen and liquid nitrogen to all insemination centres maintained by the Departments of Animal Husbandry and Dairy Development. Under the programme for production and supply of inputs for cattle breeding programme, the board has produced 15.29 lakh doses of frozen semen in 1984-85 against 8.94 lakh doses in 1983-84. The distribution of frozen semen has also gone up from 9.42 lakh doses in 1983-84 to 11.09 lakh doses during 1984-85. Two liquid nitrogen plants were additionally commissioned and two more regional semen banks were started, one at Pudupady and another at Chalakudy for the distribution of frozen semen and liquid nitrogen to all the northern districts of Kerala. By starting 400 units, the entire State has been brought under artificial insemination programme for cattle breeding during 1984-85. One hundred and fifty officers and 425 field staff were given training at Training Centre, Mattupetty during the period under review. Under the fodder development programme, 543 demonstration plots were organised and 20 MT of fodder seeds of selected varieties were produced for distribution among the dairy farmers. During 1984-85, 23.46 MT of fodder seeds were distributed to farmers against 16.71 MT in 1983-84.

The Kerala Co-operative Milk Marketing Federation Limited was registered under the Kerala Co-operative Societies Act, 1969 on 21st February 1980 with its Head-quarters at Trivandrum.

The primary functions of the Federation, presently is to implement the National Programme of Operation Flood-II in Kerala. The project area covers the revenue districts of Trivandrum, Quilon, Pathanamthitta, Alleppey, Kottayam, Idukki, Ernakulam and Trichur. The total outlay is about Rs. 19.5 crores and is financed by the Indian Dairy Corporation and being implemented by the Federation in collaboration with National Dairy Development Board. The basic concept of this programme involves the formation of village level milk Co-operative Societies on Anand Pattern, organisation of Milk Unions and the Unions so formed are federated into the apex level State Federation. Accordingly 1800 village level

Milk societies are to be formed in a phased manner over a period of seven years in the operational area of Operation Flood-II.

The Federation organised 483 dairy Co-operatives on Anand Pattern and procured 93,335 litres of milk per day during 1985 compared to 76,075 litres of milk per day during the previous year. The average milk procurement per day for each APCOS increased from 198 litres in 1984 to 218 litres in 1985. The basic function of procurement of inputs and marketing had shown remarkable improvement in 1985 compared to the previous year. The Kottayam Dairy was taken over by the Federation from the Dairy Development Department on March 1985. The capacity utilisation of the four dairies exceeded the rated capacity during the period under review. The cattle feed plant at Thuravoor was commissioned and the feed was made available in the market during May 1985. The performance details of the dairies during 1984-85 are shown in Table.

PERFORMANCE OF THE DAIRIES DURING 1984 AND 1985

Name of Dairy	*Procuring capacity per day (Litres)*	*Procurement* 1984	*(Litres)* 1985	*Average Procurement per day (Litres)* 1984	1985	*Total sales (Litres)* 1984	1985	*Average sales per day (Litres)* 1984	1985
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trivandrum Dairy	40000	13444085	17227258	36732	47328	13310000	16132328	36366	44319
Ernakulam Dairy	50000	11122076	1640750	30388	45076	9772200	12236712	26700	33617
Alleppey Dairy	4000	1845788	2053060	5043	5640	2210000	2829785	6038	7774
Kottayam Dairy	6000	..	1842889 (305 days)	..	6042	..	1966900 (305 days)	..	6449
Palghat Dairy	6000	3329541	3663911	9097	10065	3426000	4206420	9360	11556
Cannanore Dairy	10000	2681065	3135893	7325	8615	4210000	5710891	11500	15689

3|9603|MC.

As a major step in the formation of the three tier co-operative set up envisaged in the implementation of Operation Flood-II Programme, the Trivandrum and Ernakulam Regional Co-operative Milk Producer's Unions were registered during 1985. The Trivandrum Union started functioning from 1st October 1985. The Federation introduced the differential pricing system for milk during flush and lean seasons from October 1985.

As on 31st June, 1985 there are 1,440 Primary Milk Co-operative Societies and 10 milk supply Unions working under the control of the Dairy Development Department. Of the total, 456 societies were converted as Anand Model Co-operative Societies.

The College of Veterinary and Animal Sciences Mannuthy

The Veterinary College was established in 1955 to train sufficient veterinary personnel to meet the expanding developmental needs. It is located at Ollukkara, Mannuthi, 7 kms. away from Trichur. The college initially managed by the Department of Animal Husbandry was transferred to the Kerala Agricultural University in 1971. It was renamed as the College of Veterinary and Animal Sciences. 18 Departments function in the College. The College has as its instructional units two Veterinary Hospitals one at Mannuthy and the other at Trichur, a Livestock Farm, a Poultry Farm, a Pig Breeding Farm and an Artificial Insemination Centre.

The College conducts an under Graduate and a Post Graduate Programme.

FISHERIES

Fisheries form one of the crucial sectors for promoting economic development of Kerala. The marine resources of the State are reckoned to be unique and more productive than those of other zones of the Indian coast. Its richness is mainly due to the presence of the commercially important shoaling species of sardine and mackerel and the prawns found near the shore. In addition to its contribution to a flourishing export trade the fishing industry is capable of providing cheap protein food to fight malnutrition. Modern fishing and other allied industries open up new avenues of employment.

There is a hoary tradition to the marine fishing industry in Kerala. An ancient Malayalam treatise. "Valavisu Puranam" contains several references to the prevalent fishing techniques. Scattered evidence in the songs of the Sangam Age (1st-4th century A. D.) and writings of travellers like Pliny who wrote in the first century A. D. throw light on the immensity of fishery and the importance of the fishing community. Sangam literature divided Tamizhagam (which included the present day Kerala) into five Thinais. One of these the coastal Thinai—the Neythal—was inhabited by tribes called Parathavars, Velayars, Meenavars and Nulayars whose main occupation was fishing, salt making and pearl collecting. Later day evidence also high lighted the abundance of fish. Friar Odoronic who sailed down the West Coast of India in 1320 observed "these are fishes in those seas that come swimming—in such abundance that for a great distance into the sea nothing can be seen but the back of fishes, which casting themselves on the shore, do suffer men for the space of three daies (days) to come and take on many of them as they please". The teeming shoals of oil sardines which migrate to the West Coast clinging close to the inshore waters, might have piloted the navigational course of the maritime Arab traders to Malabar. The advent of the colonial powers. resulted in the systematic classification of the fish wealth for scientific value. Francis Day's "Fishes of Malabar" '1865' was one of its kind. The waters of the Travancore region in the 1940's was calculated to yield 2 cwts per acre (i. e., 254 kg. per hectare) which was "double the quantity produced by an acre of water considered to be rich by the fishery experts of the world". This was in spite of the fact that only 15% of the harvestable area was fished (1200 square miles out of a total of 8000 square miles of sea). The theoretical yield potential in the untapped area was half a million tonnes." (Travancore State Manual—T. K. Velu Pillai, Vol. III, P. 433).

The catamarans of South Travancore coast and the dug out canoes of the Malabar Coast are small, light boats which are operated with oars and sails. Several types of nets—boat seines, shore seines, large drift nets, gill nets, cast nets are used along the coast. In Malabar there is a special net for almost every type of fish. These are quite efficient for small scale fishing and well suited to the craft used. The fishermen are robust, hardy and possess a good knowledge of the fish, the fishery conditions and the seasonal changes in the physical conditions of the area of the sea where they fish.

Economically they are at a low level of the social ladder. Co-operatives of fishermen are being organised in most parts of the State.

An industry based on sea fishing and curing of fish has developed into large proportions during the last few centuries. About 50% of the fish caught is utilised in fresh condition and the rest is sun dried or salted, or frozen, and the surplus residual converted into manure. Special attention is being paid by the Government to improve the methods of processing fish and prawns. Cold Storages and ice plants have been established at various places on the coast and private industry has entered the field in a significant manner for freezing good quality fish and prawns for export.

Administrative action for the development of fishing industry in Kerala started with the establishment of 35 fish curing yards in 1877 on the coast of Malabar of the then Madras Presidency. In 1898 a Fisheries Bureau was set up at Madras. Sir Frederic Nicholson hailed as the father of the co-operative movement in India was the first Director of the Madras Fisheries Department. The States of Cochin and Travancore also had separate Fisheries Departments from about 1920 and initiated much useful work. Fisheries development in Travancore Cochin was systematised with the establishment of the Department of Marine Biology and Fisheries in 1946. Schemes relating to the exploitation of some of the off shore fishing grounds, preservation of fish, biological studies of coastal fish, fish culture in fresh and brackish waters and research in preservation of fish and fisheries, products were undertaken with financial assistance from the centre under the Grow More Food Schemes. A separate department of Fisheries was established in 1952 and fisheries development schemes were undertaken during the First Five Year Plan. Fisheries schemes included in the Second Five Year Plan of the newly constituted State of Kerala were for the development of fishing harbours, establishment of ice and cold storage plants, assistance to Co-operatives, mechanisation of small fishing boats, fish culture in inland waters and improvement of fish curing scheme.

The Marine Biological Station at Kozhikode was established for investigation of sardine and mackerel which constitute the main fisheries of the area and some of the early researches relating to Indian fisheries were carried out at the

station. Later research stations were set up at Vizhinjam, Ernakulam and Thiruvalla for carrying investigation on marine and fresh water fisheries problems.

The fish production in Kerala in 1984 is estimated at 4.52 lakh tonnes comprising 4.25 lakh tonnes of marine fish and .27 lakh tonnes of inland fishes. The export of marine products in 1983-84 was 32,840 tonnes valued at Rs. 140.85 crores. The annual per capita consumption of fish is estimated at 10.5 kg. In 1982-83 the fisheries sector contributed Rs. 82.39 lakhs to the State Income. With 590 km. of sea coast forming about 11% of the coast line of India, Kerala contributes nearly 30% of all India marine fish production (3.85 lakh tonnes out of the All India Marine Fish Production of 14.15 lakh tonnes in 1983). The continental shelf with an average width of 50 km. has a fishable area of nearly 23,000 sq. km. But the present exploitation is confined to the inshore region extending upto the 25 km. belt. The area beyond the region could be profitably tapped. For the Kerala coast the potential yield from the shelf region is estimated at 1.3 million tonnes of fish of which the present exploited forms only one third.

The resources that are present along the coastal and inshore regions include fish, crustaceans, shell fish and sea weeds and other plant elements. The Indian mackerel (Rastrelliger Kanagurta) constituting the most important pelagic fisheries in India contributes to about 10% of the total marine fish landed on the coast. Among the clupeoid fishes which constitute a large part of the marine fish production of the country the oil sardine (sardinella longiceps) of the Kerala coast ranks as the most important commercial species. It is much esteemed as a valuable food fish and is used intensively in the manufacture of oil, guano and meal. A sardine oil industry flourished on this coast in the earlier years of abundance and the magnitude of the catches would become apparant that about 285,000 tonnes of oil sardine had been utilised in the seasons of 1922-24 for the production of guano alone excluding the quantity consumed in the fresh condition and used for curing or converting into manure. The years 1957 and 1958 were like-wise very productive for oil sardines.

Prawns constitute the third group of commercially important fish of Kerala. The large chain of lakes, commonly called backwaters or kayals extending along the southern half of the Kerala coast and the mouth of numerous hill streams in the

Malabar area yield large quantities of Prawns. About 4050 hectares of single crop paddy lying along the edge of backwaters and connected canals are utilised for prawn culture and about 1800 tonnes of prawns are caught annually. Only a small portion of the catch is consumed locally, the rest is exported to U. S. A., Japan, E. E. C. Countries etc. A good export trade in frozen prawns and lobsters has developed, with Cochin as the hub of a flourishing fish processing industry. Soles, sharks and rays, cat-fish, pomfrets, caranx, silver bellies etc., are some of the major fisheries of the coast having considerable local importance. Among the shell fishes, brown mussel, which is considered as one of the sea food delicacies by the coastal people and the green mussel are found in some abundance on the Kerala coast. Molluscan shells for lime are gathered from the estuaries and backwaters in considerable quantity. On the west coast the sub fossil deposits of Mereterix, Arca etc., are extensive on the Vembanad lake.

Other marine products of commercial importance on the Kerala coast are the sea weeds. Kerala, particularly the district of Trivandrum has a wealth of Gracllaria which is of great importance in the preparation of Agar. The sea weeds available on the shore and backwaters are also of value as a manure. These resources are under various stages of development and management. The integrated oceanic-cum-exploratory fishing undertaken by the Indo-Norwegian Project vessels since 1972 has revealed the existence of several species of sea perches and rock cods in depth range 75 to 100 metres. The region lying between 101 to 179 metres depth offer good trawlable grounds, especially in the area north of Cochin to Karwar. Between 180 to 450 metres, depth contour, good trawling grounds for fish, deep sea prawns and lobsters are available. The bulk of the fish species can support a fish meal or fish paste industry. The existence of good fishing grounds in the Wadge Bank extending over 10,000 sq. km. south of

Vizhinjam provides further scops for deep sea fishing by fishing vessels from Vizhinjam. Exploratory fishing for Tunas in drift netting, purse seining and mid-water trawlling conducted by the Indo-Norwegian Project and other agencies has shown abundance of Tunas in the off shore waters. Already Japan, U.S.S.R., Korea and Taiwan are engaged in the exploitation of Tuna resources in the Indian Ocean. Compared to these nations, India particularly Kerala has all the natural advantages for harvesting these resources.

The figures relating to marine fish landings are presented below:

MARINE FISH LANDINGS IN KERALA AND INDIA DURING 1965-1984

(Lakh tonnes)

Year	*Kerala*	*India*	*Percentage of Kerala to India*
(1)	(2)	(3)	(4)
1965	3.39	8.33	40
1970	3.93	10.77	36
1975	4.21	14.23	30
1980	2.80	12.50	22
1981	2.74	13.78	20
1982	3.25	14.24	23
1983	3.85	14.15	27
1984	4.25	18.09	23

The following table shows a comparative statement on annual landings of selected marine fishes.

ANNUAL LANDINGS OF SELECTED MARINE FISHES IN KERALA DURING 1980-1984.

(*Quantity in '000 tonnes*)

Species	1980	1981	1982	1983	1984
(1)	(2)	(3)	(4)	(5)	(6)
Oil Sardine	69.7 (25.0)	147.0 (53.6)	143.2 (44.0)	154.9 (40.2)	101.8 (24.0)
Mackerel	18.4 (6.6)	16.2 (5.9)	10.7 (3.3)	12.7 (3.3)	20.9 (4.9)
Prawns	52.6 (7.0)	22.3 (8.1)	26.7 (8.2)	29.7 7.7)	31.1 (7.3)
thers	138.3 (49.5)	88.9 (32.4)	144.8 (44.5)	188.0 (48.8)	270.9 (63.8)
Total	279.0 (100.0)	274.4 (100.0)	325.4 (100.0)	385.3 (100.0)	424.7 (100.0)

The exports of marine products through the ports in Kerala was 32,840 tonnes valued at Rs. 140.85 crores in 1983-84. This constitutes 35.4% of the quantity and 37.8% of the value of the exports from India during the same period (92,691 tonnes valued at Rs. 373.02 crores). Frozen shrimp constituted the single largest item of marine product exports from Kerala 27,476 tonnes valued at Rs. 129.24 crores representing 83.7% of the total exports and 91.8% of the value realised. Frozen frog legs and frozen fish form the other major items of export. The details relating to marine fish landings in Kerala from 1980 to 1984 is given hereunder:

MARINE FISH LANDINGS IN KERALA
(1980-1984)

(*Tonnes*)

Species	1980		1981		1982	
	Actual	*Percentage*	*Actual*	*Percentage*	*Actual*	*Percentage*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Elasmobranchs	6803	2.4	4871	1.8	6287	1.9
2. Cat Fishes	13936	5.0	9565	3.5	9497	2.9
3. Chirocentrus	1002	0.4	973	0.4	1060	0.3
4. (a) Oil Sardine	69667	25.0	146986	53.5	143205	44.0
(b) Other Sardines	11017	4.0	7652	2.8	7864	2.4
5. Anchoviella	7772	2.8	4293	1.5	13184	4.0
6. Thrissoeles and other Clupeoids	2815	1.0	1578	0.6	3983	1.2
7. Perches	17814	6.4	8549	3.1	11067	3.4
8. Red Mullets	1	..	33	..	244	0.1
9. Sciaenids	6164	2.2	3145	1.2	3568	1.1
10. Ribbon Fish	12937	4.6	7066	2.6	11042	3.4
11. Caranx	4760	1.7	5050	1.8	2997	1.0
12. Leiognathus	4147	1.5	2826	1.0	8723	2.7
13. Lactarius	861	0.3	879	0.3	1609	0.5
14. Pomfrets	907	0.3	1373	0.5	4242	1.3
15. Mackerel	18474	6.6	16200	5.9	10717	3.3
16. Seer Fish	3763	1.3	3330	1.2	5619	1.8
17. Tunnies	10611	3.8	5509	2.0	7279	2.2
18. Soles	4394	1.6	5034	1.8	11601	3.6
19. (a) Penaeid Prawns	52633	18.9	22268	8.1	26707	8.2
(b) Non-Penaeid Prawns	1742	0.6	160	0.1	65	..
(c) Lobsters	18	..	50	..	..	..
(d) Other Crustaceans	7286	2.6	2998	1.1	4464	1.4
20. Cephalopods	4244	1.5	2376	0.9	3524	1.1
21. Miscellaneous	15775	5.5	11631	4.3	26819	8.2
Total	279543	100.0	274395	100.0	325367	100.0

(*Tonnes*)

		1983	1984	Average for 1980-84			
		Actual	*Percent tage*	*Actual* (P)	*Percen-tage*	*Actual*	*Percen-tage*
(1)	(2)	(8)	(9)	(10)	(11)	(12)	(13)
1.	Elasmobranchs	8463	2.2	5036	1.2	6292	1.9
2.	Cat Fishes	15159	4.0	13928	3.3	12417	3.7
3.	Chirocentrus	1090	0.3	2771	0.6	1379	0.4
4.	(a) Oil Sardine	154872	40.2	101844	24.0	123314	36.5
	(b) Other Sardines	5315	1.4	71880	16.9	20745	6.1
5.	Anchoviella	55030	14.3	46624	11.0	25380	7.5
6.	Thrissocles and other Clupeoids	7899	2.1	19421	4.6	7139	2.1
7.	Perches	9814	2.	2808,	0.7	10010	3.0
8.	Red Mullets	152	..	..	..	86	..
9.	Sciaenids	6110	1.6	7128	1.7	5222	1.5
10.	Ribbon Fish	1109	0.3	2442	0.6	6919	2.0
11.	Caranx	16508	4.3	2071	0.5	6277	1.9
12.	Leiognathus	9495	2.5	4183	1.0	5874	1.8
13.	Lactarius	1099	0.3	1412	0.3	1172	0.3
14.	Pomfrets	1991	0.5	1423	0.3	1987	0.6
15	Mackerel	12675	3.3	20894	4.9	15792	4.7
16.	Seer Fish	6999	1.8	3988	0.9	4739	1.4
17.	Tunnies	5750	1.5	4715	1.1	6772	2.0
18.	Soles	13323	3.4	6454	1.5	8161	2.4
19.	(a) Penaeid Prawns	29752	7.7	31139	7.3	32499	9.6
	(b) Non-penaeid prawns	105	..	..	..	414	0.1
	(c) Lobsters	...	..	93	..	32	..
	(d) Other Crustaceans	6880	1.8	..	..	4325	1.3
20.	Cephalopods	1730	0.4	4910	1.2	3356	1.0
21.	Miscellaneous	13955	3.6	69554	16.4	27546	8.2
	Total	385275	100.0	424718	100.0	337859	100.0

(P) Provisional.

The contribution of inland fisheries to the total fish production of the State in 1984-85 is estimated at 0.27 lakh tonnes. This represents 6.1% of the total fish production. The species-wise composition of inland fish production in Kerala is given below:

SPECIES-WISE COMPOSITION OF INLAND FISH PRODUCTION IN IERALA (1982-83, 1983-1984 & 1984-85)

(*Tonnes*)

	1982-83		1983-84		1984-85	
Species	*Actuals*	*Percentage*	*Actual*	*Percentage*	*Actual*	*Percentage*
Prawns	5,850	22.17	5,968	21.91	5,992	21.7
Etroplus	2,930	11.10	2,971	10.91	2,980	10.8
Murrels	2,921	11.07	2,962	10.87	2,963	10.7
Tilapia	4,255	16.13	4,405	16.17	4,784	17.3
Cat Fish	2,730	10.35	2,827	10.38	2,940	10.7
Jew Fish	1,533	5.81	1,584	5.81	1,672	6.1
Others	6,166	23.37	6,523	23.95	6,286	22.7
Total:	26,385	100.0	27,240	100.0	27,617	100.0

Fish Consumption

The internal consumption of fish in the State in 1984 is estimated as 14.5 kg. per person.

Fishing Equipments

The bulk of marine fish production comes from the inshore areas in which powered as well as small powered craft operate. The strategy of development has been to intensify the fishing effort with powered craft in this sector while developing the infrastructure for fishing in off-shore and deep sea areas. This involves (1) improvement of fishing methods (2) development of deep sea fishing (3) provision of fishing harbours and (4) Organization of fish transport, storage, marketing and utilization of fish. With liberal assistance from the Government of Norway

an Integrated Fisheries Project covering boat building, fishing and marketing has been formulated in several maritime states. It also aimed at the economic emancipation of fishermen through organization of co-operatives for the management of industry. The improvement of health and hygiene by the provision of potable water and introduction of better sanitation was a target. The project which was started in 1953 as an area development programme in the Sakthikulangara-Neendakara area was shifted to Cochin in 1963. The administration of the project that was till then vested with the Government of Kerala was taken over by the Government of India. To assist the development of mechanised fishing, harbour facilities are being provided at several points round the coast.

A Central Institute for training Marine Fisheries Operatives was set up in Cochin in 1963. There is also a Central Fisheries Technological Research Institute at Cochin engaged in the propagation of improved designs of fishing craft and fishing gear. The plan schemes have centred round mechanisation of fishing crafts, construction of fishing harbours, establishment of ice plants and cold storage and provision for infrastructural facilities for marketing and distribution.

Fishing craft and gears

The fishing craft may be broadly divided into two categories. (1) the indigenous or non-mechanised and (2) mechanised. The non-mechanised craft may again be divided into three types viz., (1) catamaram (2) the dugout canoes and (3) plank built canoes.

The catamarans

The catamaran is one of the traditional types of fishing craft used along the east coast from Orissa to Cape Comorin with a short extension northwards on the Kerala Coast. In Kerala the catamaran is confined to the districts of Trivandrum and Quilon. This Reelless craft is formed by tying together a few logs of light wood—three to five—with coir ropes to form the catamaran. When the logs are tied together they become curved and shaped like a canoe. Its length varies from 3 to 6 metres depending on the number of logs used and the way they are tied together. The craft is rowed with the help of a flat wooden pole. When the craft returns from fishing the logs are separated and dried in the sun. The craft is widely used in Trivandrum district for launching thattamadi (seine net).

Dug out canoes

The dug out canoes are fashioned from large logs of Aini, Mango and Chini wood by scooping out. The keel is generally thicker than the sides. Dug out canoes are employed all over the Kerala coast for inshore and deep water fishing. Their length varies from 11 to 14 metres.

Plank built boats

Boats built of planks of various designs are extensively used in Kerala. They are made in two ways. Firstly the dug out canoes are enlarged by fixing wooden planks on sides with the help of copper nails and coir ropes. In Alleppey and Quilon districts they are called "kettuvallom". The plank built boats in Malabar are called toni. These boats can be launched even in rough weather.

Mechanised boats

The mechanisation of fishing crafts in Kerala dates back to 1953 when a tripartite agreement between the United Nations, the Government of India and the Government of Norway was signed. Mechanised boats are largely used for fishing in the State. They vary in length from 8 to 13 metres.

Nets and fishing techniques

The important nets that are used for catching various species of which may be grouped into four types viz., gill nets, seine nets, chinese nets and cast nets. The gill nets and seine nets are used for marine fishing all over the Kerala coast. The Chinese nets are employed for fishing only in the backwaters of Cochin while the cast nets are found in river in fishing.

The gill nets are those by which the fish are caught by hooking the gills when the fish swim vigorously to spit out the net they become entangled in its meshes. The gill nets used in Kerala generally are: (1) Ayila vala (to catch Mackerel) (2) Ozhukkuvala (for catching seers and cat fish) (3) Terandivala (for skates and rays) (4) Nettalvala (for white baits) and (5) Sravu vala (to catch Sharks).

The traditional Ayila vala was made of cotton and now it is replaced by nylon yarn. The Ayila vala is generally shot from the dug out canoes, but sometimes when Mackerel is available in plenty, the plank built boats are also used.

The Ozhukkuvala is another important gill net used for catching mainly Nemmin (Seer). The traditional Ozhukkuvala is made of the hemp fibre. It is now replaced by nylon floating gill nets. The Ozhukkuvala is operated day and night.

The Terandivala is another floating gill nets exclusively used for catching Terandi.

Seine nets generally refer to square or rectangular pieces joined together. They are larger and heavy gears and a number of persons are required for their operation. The seine net with a bag may be classified according to its methods of operation into three types viz., (1) Stake nets (2) Shore|beach seine nets and (3) boat seine nets. The stake net is one of the smallest type of seine nets used in the backwaters. The net operated from the shore is called shore seine nets (Karamadi's or Kamba valas). The Shore seine nets are used generally along the coast of Alleppey, Quilon and Trivandrum districts.

The seine net operated from a boat is called the boat seine net. This is one of the commonest type of nets employed in fishing prawns, sardines, Mackerels etc., along the Kerala coast.

The Chinese net (China Vala) is a kind of dip net or stationary lift net and is generally found in the coastal areas of Cochin (Backwaters).

The cast nets are generally made of cotton or nylon yarn. They are used for catching small fish like the Kanambu, Tirutha and Mullan. It is generally of 1.5 M.—3 m. in length and 1-1.5 m. in width.

The district-wise distribution of fishing gear is given in Table:

DISTRICT-WISE DISTRIBUTION OF FISHING GEARS

Sl. No.	Name of District	No. of Cast nets	No. of Drag nets	No. of Gill nets	No. of Trawl nets	No. of Boat Seines
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	Trivandrum	753	1,076	2,188	54	1,512
2.	Quilon	2,087	2,337	709	1,820	387
3.	Alleppey	4,908	9,084	3,144	402	3,275
4.	Kottayam	728	1,487	8	..	10
5.	Ernakulam	4,703	1,658	201	55	..
6.	Trichur	2,185	596	3,666	216	917
7.	Malappuram	844	354	268	211	151
8.	Kozhikode	930	431	1,013	326	171
9.	Cannanore	558	972	863	242	14
	State Total	17,696	17,995	12,060	3,326	6,437

Sl. No.	Name of District	No. of Shore Seines	No. of Stake nets	No. of Chinese dip nets	No. of Traps	No. of Hooks	No. of Other gears
(1)	(2)	(8)	(9)	(10)	(11)	(12)	(13)
1.	Trivandrum	3,561	5	3	1,624	26,119	504
2.	Quilon	530	942	198	1,563	12,961	3,376
3.	Alleppey	435	1,980	362	521	43,832	3,951
4.	Kottayam	27	816	141	133	1,072	1,054
5.	Ernakulam	22	3,428	1,286	119	1,367	1,730
6.	Trichur	531	446	59	2,083	7,470	1,020
7.	Malappuram	45	53	..	312	68,117	92
8.	Kozhikode	32	187	4	1,021	16,270	428
9.	Cannanore	3	802	7	31	1,833	453
	State Total	5,166	8,659	2,060	7,407	179,041	12,608

(Census of Fisherfolk in Kerala, Directorate of Fisheries, Kerala: 1982)

Fishermen Population

The fishermen population in Kerala in 1984-85 stood at 8.64 lakhs (nearly 3.2% of the population of the State). Of these 6.68 lakhs belong to the marine sector and 1.96 lakhs to the inland sector. There are about 150 fishing villages along the coast. A large proportion of fishermen is either directly engaged in fishing operations or employed in subsidiary industries. A visitor to the coastal areas and the adjacent rural ports will be struck by the diverse activities connected with the industry. Of the total fishermen population, 1.58 lakhs have been brought under co-operative fold through the village societies in the marine (222 nos.) and inland (21 nos.) sectors. Besides, 375 scheduled caste and tribe fishermen have also been covered by the co-operative societies formed for them. The village societies are federated to the district societies which in turn are affiliated to the Matsyafed. The status of fishermen co-operatives in Kerala in 1984-85 is shown in Appendix.

Under the second phase of the subsidised housing scheme 1098 houses have been completed. Besides, 215 houses have also been built for the Vizhinjam rehabilitation programme. The development activities and welfare programmes implemented by the Kerala Fisheries Corporation, Kerala Inland Fisheries Development Corporation and the Kerala Fishermen Welfare Corporation have been transferred to the Matsyafed.

In the earlier Plans the policy of the Government, had been to promote the exploitation of shrimp for export. Distribution of traditional craft and nylon yarn, issue of mechanical boats to groups of fishermen, organisation of fishermen co-operatives etc., comprised the socio-economic measures for the uplift of fishermen. In 1966 the Kerala Fisheries Corporation was formed to organise deep sea fishing manage the shore establishments of a commercial nature and undertake export of frozen sea food products. The corporation brought four deep sea trawlers. In 1978, a Fishermen's Welfare Corporation was set up to co-ordinate welfare schemes till then managed by the Department of Fisheries. Among the important functions of the Corporation are provision of subsidised housing to fishermen, assistance to traditional fishermen, and setting up of a welfare fund. The Inland Fisheries Development Corporation was formed in 1981 for the development of brackish and fresh water prawn and fish farming with seed supporting facilities by availing institutional finance.

The Kerala Marine Fishing Regulation Act, 1980

This Act was enacted in 1980 with the twin intention of conserving marine resources and protecting the interests of traditional fishermen. The Act prohibits purse seining within the territorial waters of the State. The area of operations of mechanised and non-mechanised crafts have been clearly demarcated. Fishing boats have to be registered and the mechanised units have to take licence for operating in the territorial waters.

The Matsyafed

The Kerala State Co-operative Federation for fisheries development popularly known as Matsyafed, is the apex co-operative body in the Fisheries Sector with a wide range of activities comprising of the development of traditional sector, marketing of fish, promotion of inland fish culture, and implementation of welfare programmes for the benefit of the fishermen. The village societies constituted in the fisheries villages are presently under the administrative control of the Matsyafed. The Federation has taken over the activities of the 3 Corporations mentioned earlier, viz., The Kerala Fisheries Corporation, The Kerala Inland Fisheries Corporation and The Kerala Fishermen Welfare Corporation.

Fisheries Training Centres and High Schools

The Department of Fisheries is having five fisheries training centres and eight regional fisheries technical High Schools, under its auspices. The training courses offered for fishermen at the training centres include boat srank, marine engine servicing and repair, prawn culture, fresh water fish culture, fish processing and preservation. The fishery high schools at Valiathura, Quilon, Alleppey, Ernakulam, Chowghat, Tanur and Cannanore provide instruction upto higher secondary level.

The College of Fisheries

The College and Faculty of Fisheries were established under the Kerala Agricultural University in 1979-80. To begin with the College functioned at Mannuthy with a student intake capacity of 30. In 1980-81, the College was shifted to its permanent location at Panangad. The College offers a four year Degree Programme leading to the award of the Degree of Bachelor of Fishery Sciences (BF. Sc.). A few seats are reserved for fishermen. The Faculty has seven departments.

* See Appendix.

APPENDIX

Matsyafed—Major Activities in Detail

Despite the planned efforts made in the past, the fishermen in Kerala had continued to be in a critical level of existence. Majority of the active fishermen do not own the means of production and infrastructural facilities for processing and marketing along the coastal areas remained inadequate. As a cumulative effect of all these factors Kerala was witnessing a stagnating trend in marine fish production.

Kerala State has now made a radical shift in favour of the traditional fishermen by providing them intermediate technology in the form of modern crafts, outboard motors and new nets so as to augment the fish production and their income. The State Government is now following an integrated multi dimensional approach towards development of fisheries sector. MATSYAFED (Kerala State Co-operative Federation for Fisheries Development) will be providing institutional support to traditional fishermen through a three-tier structure. There are village societies which are federated to District Co-operatives which in turn are affiliated to MATSYAFED. The organisation is borne out of the realisation that the present bondage system must give way to a system where the means of production are owned by the fishermen themselves.

MATSYAFED aims to enable credit institutions like the World Bank, N.C.D.C., HUDCO and others to do project financing in this hitherto neglected sector. MATSYAFED also perceives an improved marketing mechanism on the beach which will help the traditional fishermen to get a better control on the disposal of their catches so that they would secure a fair price for their fish and would be freed from exploitation by middlemen. Simultaneously consumers will benefit by getting quality fish at reasonable prices.

N.C.D.C. aided Integrated Fisheries Development Project

(a) The N.C.D.C. aided Rs. 82 crores Integrated Project for Fisheries Development would raise the fish production in the traditional marine sector from 215,000 tonnes to 310,000 tonnes in 1990. This implies an increase of almost 44% in terms of productivity.

(b) The per capita production in the traditional marine sector would go up from 1.6 to 2 tonnes per fishermen. The percentage increase being 25%.

(c) The entire community of fishermen will be benefited by a total incremental income of approximately Rs. 60 crores from the N.C.D.C. Integrated Fisheries Project through increased fish landing and price advantages.

(d) The village landing facilities like drying, processing, as well as the organising of marketing will provide increased income to fishermen.

II. World Bank Prawn Culture Project

A comprehensive Project and development of 15,000 hectares with an anticipated investment of Rs. 134 crores has been approved by the Government of India and has been submitted to the World Bank for financial assistance. The highlights of the project are:

Total outlay:	Rs. 134.7 Crores
Period of implementation:	7 years
Area to be developed:	Public sector 5,000 hec. and private sector 10,000 hec.
Production benefits:	Additional production of shrimps.

Particulars	*Quantity*	*Value (in Rs.)*
Additional production of prawns	50,000 tonnes	80 crores
Additional production of fish	1,500 tonnes	1.8 crores
Additional production of coconuts	48 million	9.6 crores
Additional foreign exchange earnings		94 crores
Employment to be generated	180 lakh man days	
Regular employment of private firms	30,000 man years	
Processing	2,250 man years	

The Project also visualises to establish three prawn production units and extension wing, three freezing plants and one marketing house.

III. Flood Relief Assistance

For providing productive inputs to traditional fishermen who had suffered during the recent flood an amount of Rs. 4.27 crores has been earmarked. MATSYAFED has prepared various schemes which will benefit fishermen in both marine and inland sector in Kerala State. Implementation of these schemes will enable the Government of Kerala to provide immediate relief to the fishermen in flood affected area. An Integrated development approach is being followed so that the affected fishermen as well as the "Poorest of poor" in fishing villages are encompassed as part of the development scheme. These schemes will enable MATSYAFED to make a substantial dent on poverty in at least 100 marine|inland fishing villages where almost all the registered fishermen will in one way or other be provided with modern means of production. An amount of Rs. 276 lakhs has been earmarked for the following schemes. Providing nylon webbings to fishermen in inland and marine sectors, Revolving funds for Village Welfare Society for providing country|fibre glass crafts, Revolving funds to distribute outboard engines in flood affected areas, Revolving funds to distribute fibre glass beach landing craft to fishermen and Distribution of outboard motors on 100% grant to fishermen whose outboard motors have been totally lost or damaged. The proper implementation of this scheme would lead to (1) Creation of productive assets in Flood affected areas, (2) Immediate relief to flood affected fishermen (3) Increased production of fish, (4) Progressive marketing mechanism, encouraging higher returns to flood affected fishermen and (5) 60% of the total amount to be used as revolving funds for creation of further assets.

IV. Programme for gainful employment of fisher-women in flood affected areas

This programme, with an outlay of Rs. 25 lakhs aims to impart simple technologies relating to fish processing, curing and fish marketing to the fisherwomen in the flood affected areas. It involves setting up of training facilities, development of a team for training, transfer technology to fisherwomen, commercial production and marketing, thereby providing employment to fisherfolk and making available superior fish products to consumers. The complete marketing activities of these units

will be taken up by MATSYAFED which will be opening Mobile Snack Bars. The Project has been taken up in collaboration with Central Institute of Fisheries Technology which will transfer the proposed post—harvest technology in the areas of handling processing and preservation, and manufacturing of diversified fish products to the benefit of selected fisherwomen. All the products manufactured will be marketed through MATSYAFED net works like retail outlets, mobile Snack Bars and also through a number of dealers in and outside the Kerala State.

V. Transportation facilities for fisherwomen in Flood Affected Areas

The proposal is to operate a minimum of 10 buses from villages where the fisherwomen have considerable difficulty in transporting their products to markets. This also prevents more fisherwomen from taking up fish marketing. The problem is more acute in Trivandrum and Quilon where more of fisherwomen are engaged in marketing. Under the scheme all the fisherwomen utilising these bus services will be provided with bank loans of 1,000 rupees each at differential rate of interest as working capital. Besides employment generation of staff from the fishermen community, nearly 1200 to 1500 fisherwomen will be benefited directly and this would serve as an effective alternative to gainful employment in the fisheries village where the employment problem is worsening day by day.

VI. Reservoir Fisheries Development Project with World Bank Assistance

With a view to exploit the Reservoir fisheries potential on sound systematic lines, MATSYAFED has prepared the Reservoir Fisheries Development Project for financial assistance from World Bank. The Project would lead to utilisation of 6,465 hec. of reservoir development ranging from 20 hectares to 1200 hectares which are presently not exploited or totally un-exploited. The project would be implemented over a period of 7 years at a total cost of almost Rs. 4.4 crores. As a result of the project the annual fish production is projected to rise to 12,000 tonnes. The project would increase the production and sale of inland fish from 87 tonnes at present to 1,444 tonnes. The project in addition would stimulate employment in hatchery construction, boat building, net making, fish marketing etc.

VII. Joint venture project for prawn culture with foreign technical collaboration

In order to improve the technology to a more reliable and profitable level it has been trying to establish a Joint Venture Project with suitable foreign technological collaboration. MATSYAFED is planning to establish a joint venture company with M/s. Marattukulam, an enterprising entrepreneure who has submitted a project to establish joint venture project with technical collaboration of M/s. Bio Resources of Philipines. The investment cost a 100 hec. project would be approximately 2.8 million dollars excluding the value of land. The total annual return from the complex is estimated at 200 tonnes of prawn and 5 crores and post-larve costing 4.15 million dollars. This is about 4-5 tonnes higher than the production rates prevailing in the State at present. MATSYAFED would be establishing the Joint venture company with 26% equity participation in the total cost of the project.

VIII. Matsyafed's Nutrifish Project with assistance from Norway Development Agency

MATSYAFED has submitted a Rs. 50 lakhs project for manufacturing value added fishery products on a commercial scale at Cochin Plant making use of latest equipment and technology available in the field. All the equipment will be received as 100% grant from the bilateral assistance Agency—NORAD. The chief objective of the proposed project will be to convert the low priced fishes to value added products like fish cutlets, curry, dried products and natural packs and (2) to provide additional employment and income to fish based workers in the country and (3) to make available quality fish to the domestic fish markets and particularly to the urban and semi-urban areas and (4) to promote export and trade in quality processed food products to middle-east countries. The project envisages handling of 500 tonnes of low priced fish besides 495 tonnes quality fish in an year. The project aims at a gross surplus of approximately Rs. 20 lakhs per year. The internal rate of return will be approximately 35%.

IX. Expansion of the Deep Sea Fishing Sector Wing

A new project report has been prepared for importing two 25 m. deep sea vessels from Australia. The total outlay of the project including working capital is Rs. 197.07 lakhs. The net

profit anticipated after operating cost, depreciation, interest of the two vessels approximately is Rs. 45 lakhs per year. Anticipated annual export would be Rs. 76 lakhs. This project will enable the State to expand its existing deep sea sector wing in Vishakhapatnam from 4 vessels to 6. The organisation is also in advanced stages of negotiation with a foreign company for Joint Venture Collaboration in the Deep Sea Sector.

X. Marketing Strategy

The marketing strategy of MATSYAFED is aimed at fetching better returns to fishermen increasing the bargaining capacity at the primary level of village societies.

This is sought to be achieved by fishermen control of the primary sale through auctions. The fishermen societies at the village level will have to take up the role of marketing so that they fetch adequate and fair returns to their members. This will be made possible by providing infrastructural facilities like auction halls and Ice Storages which will prevent the fall in prices with increased landings and also eliminate the complete dependence on middle men. These societies will also facilitate direct marketing by transport facilities and facilities for curing and storage of fish.

With the implementation of the NCDC assisted integrated project and the Flood Relief Schemes, the coverage of improved marketing practices among the villages will be 80% of the major villages which by itself will bring about significant improvement in earnings of fishermen.

The control of other markets especially secondary wholesale markets is also necessary to safeguard the interests of both the fishermen and the consuming public. A regulated marketing system will streamline the transactions at various levels in fish marketing and also improve the social infrastructure necessary for fish marketing to hygienic standards.

The traditional fishermen through the primary societies will be encouraged to take up simple technologies related to fish processing and the products thus obtained will be marketed internally as well as externally.

XI. Vidyakendrams

The most significant work in the extension programmes is the starting of *Vidyakendrams* for non-formal education of fisherfolk. MATSYAFED has started 30 *Vidyakendrams* in the selected 15 villages where the N. C. D. C. Programmes have been implemented. 30 young men and women from the fishing villages were selected and they have been given non-formal education. Its aims are (1) to educate the people on their significant role as beneficiaries of co-operative fishing, (2) to educate people against common vices like alcoholism, exploitation from middlemen and also against their ignorance to various development schemes envisaged by Government and Non-Government agencies, (3) to remove illiteracy and diseases from fishing villages and (4) to popularise MATSYAFED. These Vidyakendrams are being run by MATSYAFED with the assistance and co-operation of KANFED.

XII. Lump sum Grant

From 1984-85 onwards fishermen children of matric and post matric including professional and technical courses have been given lump sum grant. Under this scheme, deserving children are able to tide over the financial hurdles in completing their education. An amount of Rs. 70 lakhs has been released so as to enable the Department of Fisheries to provide this concession to fishermen during 1985-86.

XIII. Welfare measures

MATSYAFED is extending the following welfare assistance to traditional fishermen.

Death.—The bereaved family of a fisherman who dies, or is found missing, while engaged in fishing is given an insurance amount of Rs. 10,000.

Loss of fishing implements.—Financial assistance is extended to fishermen who lose their fishing crafts.

Loans and Subsidies

Loans on D. R. I. from Commercial Banks.—MATSYAFED helps to secure loans to fishermen groups from commercial banks at differential rates of interest, under the following schemes:

Craft and gear.—Subsidy at 15% for purchase of craft and gear, subject to a maximum of Rs. 2,625.

Motorisation Scheme.—Subsidy at 25% for purchase of outboard motors, subject to a maximum of Rs. 3,000.

XIV. Community Peeling Centres

Two peeling centres have been established at Neendakara, the biggest fishing centre in the State, with the assistance of the Marine Products Export Development Authority (MPEDA), for peeling of shrimps in hygienic conditions. The sheds, managed by MATSYAFED, provide employment to about 200 fisherwomen. 4 new Peeling sheds will be constructed with financial assistance from M. P. E. D. A.

XV. Marine Regulation

Kerala Marine Fishing Regulations Act 1980 was enacted for:

1. The conservation of marine fishery resources, (2) To maintain law and order in the sea and (3) To protect the interests of the traditional fishermen engaged in sea fishing and any other matter that may be prescribed. The Act contains various provisions such as registration of all fishing vessels, issue of licence, control of total number of fishing vessels, banning of any type of fishing gears, impounding fishing vessels that violate various provisions, adjudication, appeal provisions etc.

The mechanised boats are allowed to operate only beyond 10 kms. The operation of purse-seine, ring seine, and pelagic trawls are prohibited in the entire 20 km. of territorial waters of Kerala State.

As per the latest amendment, the adjudicating officers are empowered to award such penalties which is not less than Rs. 25,000 but which may be extended to Rs. 50,000. The adjudicating officer has the right to confiscate the fishing boat if it violates the various provisions of KMFR Act for the second time.

XVI. Housing

As a part of the Flood Relief Schemes, it is envisaged that 25,000 more of fishermen households will be provided with better housing facilities. Each beneficiary will be eligible for Rs. 6,000 out of which Rs. 1,500 will be the subsidy. In phase III of the housing programmes for fishermen another 10,000 houses will be made available to fishermen by MATSYAFED.

XVII. Vyasa Stores

The Vyasa Stores have already been opened with the objective of providing fishery requisites to the fishermen. Bulk purchases of these items and subsequent retail distribution ensures excellent quality and reasonable prices. Six more Vyasa Stores will be opened shortly at the rate of one each in every Marine District. These Vyasa Stores will be supplying fishery requisites like Webbings, Ropes, Floats, Sinkers, Twines, Fishing Hooks etc., and also provisions for day to day requirements.

XVIII. Distribution of Kerosene

The availability of Kerosene for use by the traditional fishermen for their outboard motors has been increased, with the result that the full requirements are available at fair prices.

The quota for the fishing activities has been raised to 1900 kl from 600 kl previously available through the Civil Supplies Corporation. Besides revising the quota of 600 kl to 900 kl, 1,000 kl have been allotted to the fisheries sector resulting in an over-all availability of 1900 kl.

MATSYAFED proposes to set up retail distribution facilities through the Fishermen Welfare Societies and the amendment of the Kerosene and Petroleum Act will hasten this process.

STATISTICAL PROFILE OF THE FISHERIES SECTOR OF KERALA

I.	Length of coastline of Kerala	590 km.
II.	Continental shelf area	40,000 km.
III.	Socio Economic details of fishermen:	
	(a) Total fishermen population:	
	Marine	6.80 lakhs
	Inland	1.97 lakhs
	Total	8.77 lakhs
	(b) Active fishermen:	
	Marine	1.34 lakhs
	Inland	0.46 lakhs
	Total	1.80 lakhs
	(c) Total No. of mechanised Boats operating in Kerala	3,366
	(d) No. of country crafts:	
	(i) Motorised country crafts	7,214
	(ii) Non-Motorised country crafts	20,425
IV.	No. of fishing villages in Kerala:	
	1. Marine	222
	2. Inland	105
V.	Inland water resources:	
	1. Brackish lakes, backwaters and estuaries	242,600 Ha.
	2. Reservoirs	29,659 ,,
	3. Tanks and ponds	3,300 ,,
	4. Rivers	85,000 ,,
	Total	360,559 ,,

VI.	Fish landings in Kerala (1985)	361,021	Tonnes
VII.	Marine Exports from Kerala (1985-86)		
	Quantity (Tonnes)	29,580	Tonnes
	Value (Rs. crores)	138	(35% of All India)
VIII.	1. Total plan expenditure till the end of 6th Plan	Rs. 51 crores (1.8% of State Plan)	
	2. Seventh Plan (approved outlay)	Rs. 40 crores.	

3. Board Plan Objectives are Increased fish production, Development of infrastructure facilities, Improvement of skills of fishermen and technology fishing, and Welfare of fishermen.

(e) Forestry

Forests in Kerala are classified into various types mainly depending upon their structure and composition. Thus a forest type is "a natural unit of well-defined characteristics particularly with regard to its composition, structure and dynamics." A forest type is a complex entity in itself but continues to remain balanced and stable so far as the controlling environment of climatic, edaphic and biotic factors, is unaltered.

There are different systems of forest classifications but the one now generally followed in India is the one evolved by Champion (The Preliminary Survey of Forest Types of India and Burma-1935). Champion's original classification was revised in 1962 by Champion and Seth. The new classification "A revised Survey of the Forest Types of India" includes all types in all the States, Andamans and one corner of N. E. F. A. and excludes the forests of Burma. For an appreciation of forest typology in Kerala, a general understanding of the forest classification in India is essential.

The revised classification has made use of the main habitat factors as the basis of forest typology, viz. climate, topography, etc., This classification recognises four temperature zones-tropical, sub-tropical, temperate and alpine. Each these

is subdivided on the basis of available moisture into wet, moist and dry, and further subdivided on the basis of the relative dominance of evergreen, deciduous and thorny trees.

In the revised classification by Champion and Seth, forest vegetation in India is divided into five major groups, viz., tropical Forests (This includes two major sub-divisions namely, Moist Tropical Forests and Dry Tropical Forests). Sub-alpine Forests and the Alpine Scrub. Each major group is subdivided into type groups according to the availability of moisture as exhibited in the physiognomic variations like evergreen, Deciduous, thorny featurés, etc. These type groups are ultimately distinguished into climatic, edaphic, seral and degradation forms (types) depending upon their ecological status. There are thus 16 type groups which are serially numbered in the revised classification.

Forest types in Kerala

Out of the five major groups recognised in the classification, three are distinguishable in Kerala. They are the Tropical Forests-both Moist Tropical Forests and Dry Tropical Forests, Montane sub-tropical forests and Montane Temperate Forests. They are represented by seven type groups (namely Serial Nos. 1, 2, 3, 4, 5, 8 and 11 in the revised classification) and 20 types as shown below:

Major group	*Type group and serial number*	*Type*
(1)	(2)	(3)
I TROPICAL FORESTS	1. Tropical Wet Evergreen forests	(1) Southern Hill top tropical evergreen forests.
(a) Moist Tropical Forests		(2) West coast tropical evergreen Forests.
		(3) Cane brakes
		(4) Wet bamboo (reed) brakes
		(5) Pioneer euphorbiaceous scrub

(1)	(2)	(3)
	2. Tropical Semi-evergreen forests	(6) West coast semi-evergreen forests (7) West-coast secondary evergreen Dipterocarp forests (8) Moist bamboo brakes (9) Laterite semi-evergreen forests
	3. Tropical Moist deciduous forests	(10) Moist Teak bearing forests (11) Southern moist mixed deciduous forests (12) Southern secondary moist mixed deciduous forests
	4. Littoral and swamp forests	(13) Myristica swamp (14) Tropical hill valley swamp
b. Dry Tropical Forests	5. Tropical Dry deciduous Forests	(15) Southern dry mixed deciduous Forests
MONTANE SUB TROPICAL FORESTS	8. Sub tropical broad leaved hill forests	(16) Nilgiri sub-tropical Hill forests (17) Reed brakes (18) South Indian Sub tropical hill savannah wood land
II MONTANE TEMPERATE FORESTS	11. Montane Wet temperate forests	(19) Southern montane temperate forests (20) Southern montane wet grasslands

Climatic formation and variants within

Within a broad climatic zone forests may not appear uniform throughout. Here and there distinct variations can be observed This type of limited variations met within a climatic climax

type is not definitely due to differences in climatic conditions but due to some other factors. These non-climatic factors can be edaphic or biotic.

(a) Edaphic variants: Here the soil conditions are different from the average soil conditions characteristic to the prevailing climate. The effective depth, texture and the water retaining capacity of the soil may vary at different localities within the same climate. Among the forest types in Kerala, cane brakes, wet bamboo brakes, moist bamboo brakes, laterite semi-evergreen forests and reed brakes are edaphic types found within their respective climatic type groups.

(b) Succession and seral stages: In the ecological evolution of vegetation towards a climatic climax, there are various progressive and retrogressive stages. The evolutionary stages pass through a definite pattern commonly known as plant succession starting from colonisation of new soils and passing through various stages of competition and consequent elimination. The resultant vegetational complex finally reaches a stage of natural equilibrium-climax. This course of evolutionary succession from colonisation to natural equilibrium without any serious interference by non-climatic agencies such as man, animals, fire, etc. is a straight progressive evolution without any retrogressive steps and is known as primary succession. The various stages or primary plant succession are known as primary seral stages and a forest type representing a particular primary seral stage is known as a primary seral type.

As a result of fire, forest clearance, excessive grazing, unrestricted felling, the forest in question is affected to varying degrees in its form and composition. In such instances regrowth appears and leads to its own successional changes. Therefore succession is primary on sites which have originally not borne any vegetation and secondary after destruction of whole or part of the original vegetation. The various stages of evolution in secondary succession are known as secondary seral stages secondary sere and the type representing a secondary seral is called secondary seral type. The types known as Pioneer euphorbiaceous scrub, West coast secondary evergreen dipterocarp forests, Southern secondary moist mixed deciduous forests that are found in Kerala are examples of secondary seral types falling within their respective climatic Type Group.

Besides the climatic climax, edaphic and seral types, there are two degradation stage types in Kerala represented by the 'South Indian Sub tropical hill savannah wood land and the Southern montane wet grassland.

From an ecological point of view all the 20 forest types in Kerala are important and interesting but merely on an economic consideration the type group representing the Tropical wet evergreen forests, Tropical semi-evergreen forests and the Tropical moist deciduous forests are the most important. All the 20 forest types within the 7 type groups are briefly dealt with hereunder:—

Type Group: **Tropical Wet Evergreen Forests**

Tropical wet-evergreen forests exist in Kerala in the form of two of its climatic climax types namely southern Hill top tropical evergreen forests and the West coast tropical evergreen forests. Within the type group, there are two edaphic climax types namely the Cane brakes and the 'wet bamboo brakes'. Besides, there is one secondary seral type termed as pioneer euphorbiaceous scrub. However the 'West coast tropical evergreen forests' is the most important and predominant type coming under this type group.

(1) West coast tropical evergreen forests

That this type of forests probably extended throughout Kerala at one time is indicated by the floristic composition of some of the ancient *Kavus* which are still seen in the premises of some of the old family houses and temples. These Kavus contain characteristic evergreen species such as *Hopea, Diospyros microphylla .(Elicheviyan), Iophopetalum wightianum (Venkotta), Cinnamomum zeylanicum (Elavarngam), Aporosa lindliyana (Vetti),* etc., which are not found elsewhere in the neighbourhood but only in the evergreen forests. Kavus being remnants of old forests, which being strictly protected and preserved have remained unchanged retaining more or less their old floristic composition.

The evergreen forests are characterised by the "bewildering multiplicity of vegetational forms and an overpowering preponderance of green".

Champion describes the tropical wet evergreen forests as under:

"Lofty, dense, evergreen forests, 150 ft. or more high, characterised by the large number of species which occur together. Consociations (gregarious dominants) are rarely met with and two-thirds or more of the upper canopy trees are of species individually contributing not more than one per cent of the total number; a few species may be met with semi-gregariously but this is not typical. Some species of the top storey are trees with clear boles 100 ft. long and 15 ft. or more in girth, and may be deciduous, or semi-deciduous without affecting the evergreen nature of the forest as a whole. The canopy is extremely dense; it has been demonstrated that apart from the scattered giants which project well above the general canopy, differentiation into definite canopy layers probably does not exist. Epiphytes are numerous, especially, aroids, ferns, mosses and orchids. Climbers vary greatly in amount being sometimes conspicuous but often not so. Ground vegetation in typical cases may be almost absent; elsewhere a carpet of *Strobilanthes* or *Selaginella* and ferns may occur; grasses are absent. The undergrowth is often a tangle of canes, creeping bamboo and palms, which may replace high forest as cane brake along streams. Erect bamboos are unusual, but may occur locally. Long cylindrical boles usually with thin smooth bark are typical but plant buttresses are also frequently seen. The leaves are thick and glossy, only rarely finely pinnate or hairy, and are very often white or pink when young. Cauliflory may be relatively common".

For all its multiplicity of kind, the evergreen forests present striking conformities of colour, leaf shape, bark texture and other characteristics in species of varied texture and other characteristics in species of varied taxonomic affinity. This is explained by the forest's enormous antiquity; and 'the convergent resemblances between unrelated species and families in their life forms and said to have resulted by their similar adaptations and development along similar lines, in the same environment, where they are embossomed for millions of years.

Above the ground layers of herbs and shrubs, the crowns of the trees form 3 or more superposed stories, but the strata of trees are never clearly defined, as they are continuously growing. In the primary forest communities three tree strata are generally recognised in addition to the layer of shrubs and

herbs. The girth dimensions are said to have a relation with the stratification in tropical evergreen forests, and it is indicated that there is a relationship between girth frequencies and the components of stratification. (Donn Small, 1958). The crowns of the trees have a co-relation with environment. In the top story the trees are usually umbrella shaped, in the middle they are more or less 'candle flame' shaped; and are markedly conical in the bottom storey.

Buttress roots, cauliflory etc., are characteristic of many of the evergreen species. The vegetative activity is at its maximum just after the heavy rains when the landscape gradually takes on masses of variegated colours, the white and pink of Mesua (Nanku), violet of *Poeciloneuron* (Poothamkolli) and Mango, red and crimson of *Nephelium* (Cholapoovam) and Cinnamomum (Elavarngam). These form the prelude to the season of blossoms which commence in November.

The west coast tropical evergreen forests are distributed all over Kerala State, more or less throughout its length from Kasargode to Neyyattinkara and are confined upto about 1300 m. on the Western ghats. This type has been degraded to a considerable extent due to biotic influence like shifting cultivation, burning, etc. As such, it is difficult to delimit the 'true evergreens' correctly as there are large patches of secondary forests interspersed within the evergreen.

Tropical evergreen forests represent the most luxuriant type of vegetation and it is a type developed under abundant moisture supply with uniform high temperature. The average annual rainfall is about 3500 mm. and the humidity per cent does not fall below 80 mm. This type can occur in areas with rainfall of 2000 mm. and above. The mean annual temperature is about 27°C and it may fluctuate between 21°C and 33°C depending on altitude. One of the characteristics of the tropical wet evergreen forests is the contrast between the tree tops and clearings. The vertical and horizontal variations of the illumination is of fundamental importance in understanding the ecology of the forests as a whole and the distribution of its individual components.

General Floristics

The important constituent species of the top canopy are *Acrocarous fraxinifolius, Aglaia roxburghiana, Ailantnus triphysa, Ancolosa densiflora, Antiaris toxicaria, Artocarpus hirsuta, Bischofia Javanica, Calophyllum tomentosum, Carallia integerrima, cedrela toona (Tonna ciliata), Cullenia excelsa,*

Diopterocarpous bourdilloni, Dipterocarpous indicus, Diospyres assimilis, Dysoxylum malabaricum, Elaecarpus, Tuberculatus, Eugenia arnottiana, Eugenia Chavaran, Eugenia Jambolana, Filicium decipiens, Hopea parviflora, Hopea recophloea, Lopho parviflora, Hopea recopholoea, Lophopetalum wightianum, Machilus macrantha, Mangifera indica, Mesua ferrea, Myristica attenuata, Myristica malabarica, Palaquium ellipticum, polialthia fragrans, Pterosperum reticulatum, Pterospermum rubiginosum, sterculia alata, Tetrameles nudiflora and Vateria indica.

The chief species of the lower canopy or second storey are *Achronychia laurifolia, Actinodaphne hookeri, Amoora rohituka, Aporosa lindleana, Baccaurea courtallensis, Bovagea dalczelli Canarium strictum, Cinnamomum zeylancium, Diospyros microphylla, Elaeocarous serratus, Evodia lunuankenda,*—
Ficus spp., *Garcinia morella, Holigarna arnottiana, Hopea glabra, Hydrocarpus wightiana, Litsaea spp., Macaranga roxbhurghii, Mallotus philippinensis, Memeoylon edule, Mimusops elengi, Myristica heddomei, Nephelium longana,*

Pithecolobium bigeminum, Pygeum wightianum, Vernonia travancorica, Xanthophyllum flavescens and Zanthoxylum rhestsa.

The third storey consists mostly of shrubby species such as *Euonymus angulatus, Agrostistachys indica, A. Longifolia, Eugenia munroii, E. Locta, Paramognya armata, Sauropus alpicans, Leca sambucina, Saprosma fragrans, Webera spp., Clerodandron infor tunatum Macaranga roxburghii, strobilanthes spn., Laportea crenulata, Olea dioica Linocera malabarica, Callicearpa lanata pavetta zeylanica, Vernonia arborea, Lepisanthes deficiens, Turpinia malabarica, Orophea uniflora, Apama siliquosa, sarco brevifolia and Croten scabisous.*

The ground flora consists of *Cardamom, Curcuma, Strobilanthus, Selaginella, etc.*

Species of *Calamus, Pandanus, Pinanga, reeds,* etc., are often met with. Climbers are abundant, mainly of *Entada scandens, Dioscorea spp., Derris, Smilax macrophylla,* etc. Epiphytes are numerous, mosses, ferns, orchids and lichens occur almost everywhere. Buttressed base of trunks are conspicuous in species like *Tetrameles, Lophopetalum, Poeciloneuron, cullenia* etc. Cauliflory and brillantly coloured juvenile foliage are striking and attractive features of the evergreen forests; the innumerable leaches and the Elephant nettle are equally repulsive and one cannot fail to have acquaintance with these in an ever green forest.

Fauna

The popular expectation is that the evergreen forest is almost void of life. But contrary to that, it is quite rich in life, especially avifauna. Larger game animals like spotted deer, Sambhur, Bison (Gaur), etc., do not resort to evergreen forests except for cover. Most characteristic animals are the Monkeys (Lion-tailed langur and the black langur). In Kerala the melanistic variety of the Panther which preys on black monkeys is found in this type. Tiger is rare. Elephants resort to it only in dry season but where there are reeds of any extent, elephants can be met with at all seasons. The typical evergreen harbour avifauna in much lesser abundance compared to other type. Characteristic birds are the whistling schoolboy, Crested Eagle, Hornbills, Black-naped Oriole, Hill mynah, Great Malabar Woodpecker pied Hornbill, Fairly Bluebirds, Malabar Trogon, Wynad laughing Thrush, Jerdon's Chloropsis, Lorikeet, Partridges, etc. Of these some birds may be seen in rare numbers in the deciduous areas as well. Some of the birds are 'solemnly garbed, for permanent life in the shadow and can only be found in the evergreens'.

There are also a vareity of cold blooded animals, reptiles and amphibians. King cobra which grows up to an enormous size, rivalling that of the Python, is met with in these forests. The beautiful black and yellow tortoise also is found in these forests.

(2) Southern hill top tropical evergreen forests

This is sometimes referred to as low tropical ghat evergreen forests. This type is found on some of the upper slopes and tops of ridges, generally above 950 m. This can be seen on the top slopes of high ridges around the Kulathupuzha valley above 1100 m., Goodrickal, Anamalai etc.

In general physiognomy this type has similarities with the rest of the wet evergreens of Kerala. However, the low, or the hill top evergreens have relatively shorter trees as compared to the other evergreen sub-types existing at lower elevations. The tree branches generally look shaggy on account of mosses covering them. Eugenia spp., *Elaeocarous spp.*, etc. occur in plenty. *Mesua Ferrea, Dysozylum malabaricum, Palaquium ellipticum, Cullenia excelsa, Calophyllum elatum, Cedrela toona* etc., also occur in this sub-type but of less graceful stature unlike in the high level evergreen forests.

(3) Cane Brakes

This type occurs through out the evergreen areas in moist hollows extending outwards to various distances. This type may also occur in the semi-evergreen areas and locally in moist deciduous forests. This edaphic type is however, more conspicuous with heavier and better distributed rain fall, i. e., in the tropical wet-evergreens. The soil is permanently wet and is usually fine clay, very rich in humus. The main species are *Calamus thwaitcsii, C. travancoricus, C. rotang and C. gamblei*. At higher elevations, sometimes, creeping bamboo *(Teinostachyum)* is met with and sometimes other palms such as *Arenga wighti* and *pinanga dicksonii* are also found.

(4) Wet bamboo (reed) brakes

The brakes are often very dense. The bamboos tend to be of the smaller type rather than the big clumped species. This type is distributed throughout the tropical evergreen tracts of Kerala and also the rest of South India. The wet bamboo or the reed brakes are usually found along streams or on badly drained hollows more or less displacing the true forests, while the cane brakes replace them in the wettest sites. The flora consisting of *Ochlandra* spp. (reed) frequently occur in damp sites in the evergreen and semi-evergreen forests and are prone to extend considerably if the canopy is broken for any cause. As, however, the major occurrences are mostly in the higher hills, they are described under the sub tropical vegetation types.

(5) Pioneer Euphorbiaceous scrub

This is the only form of secondary growth in Kerala recognised in the revised classification as a secondary seral type of the wet evergreens.

In moist evergreen and semi-evergreen forests, if heavy felling or clearfelling is made and then the area left as such to its natural regrowth, it is commonly observed that a cover of quick growing but short lived small trees is quickly established. The euphorbiaceous and closely related genera sub as Macaranga, Mallotus and Trema usually predominate as a first stage in the secondary sere, providing shade and shelter under which the slower and less adaptable species of the latter stages become established and ultimately push through and supplant the pioneers. In Kerala, the important components of the flora of this type, are *Macaranga indica, Mallotus philippinensis,*

Sterculia urens, Vernonia travancorica, Terma orientalis, Grewia tiliaefolia, bamboos, etc.

The latter stages are represented either by secondary evergreen forest, secondary semi-evergreen forest, secondary moist decidous forest or even by low level grasslands, etc., as the case may be. These seral types are very often quite distinct from the typical evergreen forests in structure and composition but their evolutionary tendencies are towards the parent climax type if left undisturbed in their evolutionary process.

(6) West Coast semi evergreen forests

It is a closed high forest with heterogenous mixture of evergreen and deciduous species, the former generally predominating in number. The deciduous species generally occur in the top canopy whereas the lower storey is mainly evergreen. Bamboos are usually present, *Bambusa arundinacea* being the common species. Climbers are heavy and epiphytes abundant.

Though Champion and Seth recognise this type as a climatic climax type, its ecological status is a matter of controversy. It is considered by some authors as a secondary type of tropical wet evergreen forests formed as a result of considerable disturbances of interference with the climax forests. As against this prevalent view of its secondary seral status, some others hold the view that it is probably a primary seral stage in its progression towards an evergreen climax. Whatever be the real ecological status, the tropical semi-evergreen forest lies as a transitional zone between the wet evergreen and moist deciduous forests.

Locality factors are more or less same as in the case of the tropical wet evergreen forests. The average rain fall however may be taken as 2,000 to 2,500 mm. though at places it may be more. The semi-evergreen forests may occur from plains upto an elevation of over 1000 metres and adjoining the tropical wet evergreen forests. This type occurs in almost all the forest divisions of Kerala.

Floristic composition of this type depends on the component species of the evergreen and the deciduous forests occuring around. The percentage of the evergreen species and the desiduous species varies depending on various factors, particularly the 'moisture regime'. In general, more than 50% of species are evergreen in this type of forests. In this type, being very often subjected to biotic interferences the prevalence of species is not always decided by the sociability of the species alone.

The floral composition of this type is more or less as below:

Top Canopy

Adina cordifolia, Anthocephalus cadamba, Autocarpus hirsuta, Calophyllum tomentosum, Cedrela toona, Eugenia chavaran, Eugenia Jambolena, Holoptelea integrifolia, Hopea parviflora, Legerstroemia lanceolata, Lagerstroemia flosreginae, Mangifera indica, Melia dubia, Miliusa velutina, Mitragyne parvifolia, Polyalthia fragrans, Pterospermum reticulatum, Ptersoperumum rubiginosum, Spondias magnifera, Sterculia alata, Terminalia paniculata, Tetrameles nudiflora, Vateria indica, Vitex altissima.

Lower Canopy

Anacolosa denisflora, Aporosa lindleyana, Baccaurea Courtallensis, Bocagea dalzellii, Canarium strictum, Cinnamomum zeylanicum, Evodia lunuankenda, Mallotus philippinensis, Xanthophyllum flavescens.

Bamboos & Reeds

Bambusa arundinacea is the commonest bamboo. *Ochlandra travancorica* occurs in large patches in certain localities, especially in areas subjected to shifting cultivation.

Under growth

Antidesma diandrum, Calamus rotang, Calamus travancorica, Clerodendron infortunatum, Flausena wildenovii, Creoton malabaricum, Eleagnus latifolia, Glycosmos pentaphylla, Neteniana, Leea samucina, limonia acidissia , Murraya exotica, Strobilanthes spp., etc.

Climbers

Entada scandens, spatholobus roxburghii, Dioscorea spp. etc.

(7) **West coast secondary evergreen Dipterocarp forests'**

Among the foot hills of the western ghats and on the coastal plain below the ghats, there exists here and there nearly pure patches of evergreen Dipterocarps of relatively poor development but with an even and typically dense canopy without a definite middle storey but with an undergrowth of evergreen shrubs.

The secondary type of forest is usually the result of human interference. This type is usually met with in the evergreen and semi-evergreen areas in which cleared areas were abandoned after a short period of cultivation. The more successful colonisers such as Hopea parviflora, *Dipterocarpus spp.*, etc., of Dipterocarpaceae occupy the abandoned areas and establish themselves. The *Hopea* patches seen in the old and abandoned tea and coffee estates and the hillmen settlements of the Shendurny and Kulathupuzha reserve forests are the typical examples of this secondary forest type.

In Kerala this type is characterised by the predominance of Hopea parviflora. Other members of the flora in the top and middle storeys are *Polyalthia fragrans, Vateria indica, Knema attenuata (Syn. Myristica attenuata, Xylia xylocarpa, Bombax ceiba, Glochidion spp., Macaranga peltata, Kingiodendron pinnatum*, etc.

Generally a heavy undergrowth of reed is usually met with in this area.

(8) **Moist bamboo brakes**

This type is met with locally throughout the semi-evergreen and moist deciduous forests. The natural occurrence of bamboo brakes would appear on certain soil conditions. They favour stream sides and shady slopes but also extend their territory very greatly as secondary associations. The typical localities under this type can be seen in Nilambur. Here, the flora is characterised by the preponderance of *Terminalia crenulata* in the top canopy and *Bambusa arundinacea* in the second storey. In the lower stratum *Clerodendron viscosum* comes up in plenty.

Besides the moist bamboo brakes, there are two other edaphic types found in the type group. They are the cane brakes and the wet bamboo brakes which are very similar to the same described under 'Tropical wet evergreen forest'.

(9) **Laterite semi-evergreen forests**

It occurs in the degraded lateritic areas where the soil is partly or mostly hardened by exposure. This type is found in coastal plains. The general climate is that of evergreen and semi-evergreen forests.

This edaphic type is often characterised by the presence of Xylia xylocarpa. The top canopy flora also consists of

Terminalia Tomentosa, Terminalia Paniculata, Pterocarpus marsupium, Anogeissus latifolia and Grewia tiliuefolia. The second storey contains *Careya arborea, Bridella retusa, Calycopteris floribunda, Strychnos nux-vomica, leeaii indica,* etc. The undergrowth is generally sparse consisting of *Adhatoda vasica, Holarrhena antidysenterica,* etc. In Karnataka, this type is often referred to as *Xylia* mixed forests.

Type group: **Tropical moist deciduous forests**

This is a type group which is also known as 'Monsoon forests'. Under this type group, there are three types in Kerala which are described in the succeeding pages (as type Nos. 10, 11 and 12). The general characteristics of this type group are described as under:—

It is a closed high forest of about 30 m. to 37 m. high in which the dominant species are deciduous. In areas where the availability of soil moisture is considerably high a few evergreen species may be met with in the lower strata but generally they are absent. From an economic point of view this is the most important type in Kerala and they carry valuable timber species including Teak and Rosewood. Here, for description, all moist deciduous forests of Kerala are treated as one type, however, recognising the fact that at higher elevations and more moist localities within its climatic zone a transition to the semi-evergreen type may be observed. This transition is characterised by the presence of a relatively luxuriant undergrowth, an increase in number of evergeen species in the lower stories, and also by the lower percentage of certain deciduous species like Teak as compared to the typical tropical moist deciduous forests with a slightly lower rain fall.

Schimper defines the monsoon forest as more or less leafless during the dry season, especially towards its termination or tropophilous in character, usually less lofty than the rain forests, rich in woody lianas, rich in herbaceous but poor in woody epiphytes.

The forests contain a large number of commercial timber species of which teak is the most important. As compared to the evergreen forests, the floral composition is not as rich. Bamboo undergrowth is commonly met with and bamboo tends to spread when the canopy is open. The habitat conditions are truly reflected in vegetation and the deciduous habit is an adaptation to withstand the moisture deficiency. Most of the

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species in this type are pronounced light demanders and therefore the characteristic layering as seen in the wet evergreen forests is not clearly exhibited.

The trees mostly have rounded crowns under favourable conditions and tall cylinderical boles in case of many species. Butress formation is not characteristic but may be found in some species. Fluting of the stems is often a common feature, e. g., teak. Another characteristic feature is the thick bark, mostly fibrous and fissured in all shapes. Thus the species constituting this type are well equipped for its development in the particular habit. Though gregariousness is not characteristic, it can sometimes be seen due to the nature of the soil and other factors.

Though the animals and birds found in this type can be seen also elsewhere, they are conspicuous by their comparative abundance in this type. The typical moist deciduous forests are usually richer in their fauna than any other forest type. It is here that one meets with a vast faunal complex both from the point of view of abundance and variety. The game barking deer, tiger, leopard, sloth-bear, wild pig, etc. There are several lesser animals as well, such as the civet-cats, mongoose, giant squirrel, flying lizards, hyaenas, porcupine, jackals, etc. The bird population also exhibits a great deal of variety. Typically the avifauna of most deciduous forests consists of birds like the Backet-tailed Dronge, black-headed oriole, tree-pie, hornbill, shama, whisting-thrush, large barbet, paradise fly-catcher, laughing-thrushes, horned-owl, crested hawk, crested serpent-eagles, wood peckers, parakeets, green pigeons, emerald dove, brain fever bird, etc., and those well-known game birds-the grey jungle fowl, and the spurfowl.

This type is found in areas with medium rain fall varying from 1500 m. to 2500 m. and with well drained fertile soils. This type is well represented throughout the State. The moist deciduous forests on the eastern side of the Western Ghats, in the plateau areas such as the Wynad plateau, and in portions of Palghat and Nemmara Divisions, are relatively drier and receives a lower rain fall. Temperature requirements is almost the same as for tropical evergreen forests. Mean temperature of the year varies from 24°C. to 26.7°C. and the mean maximum from 35°C. to 37°C. Mean January temperature does not fall below 18.3°C. The dry season extend from 4 to 6 months in a year.

This type occurs in a variety of soils and rocks; but it prefers and attains best development under well drained loamy soils and an undulating topography. Rocks are for the most part metamorphic (granite gneiss and schist). Although not attaining best development, it also occupies most of the lateritic soils. On exposed aspects and impervious soils, it reduces to drier type with poor development.

General floristics

The most characteristic species of this type in Kerala are Tectona grandis, *Terminalia Paniculata, T. tomentosa, T. helerica lagerstroemis lanceolata, pterocarpus marsupium, Adina cordifolia, Mitragyna parvifolia, Crewia tiliaefolia, Sterospermum personatum, Dalbergia latifolia, Xylia xylocarpa, Bombaxoceiba (Salmalia malabarica), Vitex altissima,* and others. The species that commonly occur below the dominants are *Scheichera oleosa. Careys arborea, Dillenia Pentagyna, Kydia Calycina Lannea coromandelica, Evodia luna-ankenda Gmelina arborea, wrightia tionctoria, bridelia retusa, Sterculiavillosa, Macaranga peltata, Holarrhena antidysenterica, Randia dumetorum Smecarus anacardium, Buchanania latifolia Aporsoa lindleyana,* etc. The main bamboos are *Bambusa arundinaceal, Dendrocalamus strictus* and rarely *oxytemantherea monestigma. Dendrocalamus strictus* generally indicates drier conditions. The lower layers of the flora comprise *Helecteris isora, Glycomis oentaphylla, leea indica, Clerodendron viscosum,* etc.

In the light of the general description already given above the types within the type group shall be dealt with briefly,

(10) **Moist teak bearing forests**

This type is characterised by the presence of teak in varying properties. There are slight differences in floristic composition within this type itself due to differences in environmental conditions. On the basis of these differences sometimes three sub types are recognised. They are (a) very moist teak forests characterised by higher rain fall, a low percentage (less than 10%) of teak and very dense evergreen undergrowth; (b) moist teak forests characterised by a relatively lesser rainfall and a higher percentage of teak (10 to 25%); and (c) slightly moist teak forests with still lower rain fall, a still higher percentage of teak (20 to 60%), moderate under growth and a high proportion of deciduous associates. The sub type (a) is the most predominent in Kerala where as sub

type (b) is confined to certain areas near Palghat and sub type (c) to certain areas such as Cheleth in Kozhikode Division and Wadakancherry in Trichur Division.

(11) Southern moist mixed deciduous forests

In this type the evergreen component is usually larger than the 'moist teak bearing forests'. Teak is generally absent but may be present occasionally. The type is distributed all along the Western Ghats and inlands where the climate and soil are suitable. This occurs usually in damp valleys. In floristic composition, this type comes closer to 'very moist teak' sub type.

(12) Southern secondary moist mixed deciduous forests

This type is generally found in areas which experience a climate appropriate to tropical wet evergreen or atleast tropical semi-evergreen forests. The reason attributed to this situation, i.e. occurrence of deciduous forests in wet-evergreen or semi-evergreen climate, is that these moist deciduous forests are of secondary origin in the evergreen sites, the climatic climax being replaced by biotic influences such as shifting cultivation, grazing, burning, etc. Except for the scattered survivors of the primary forests in damp hollows, big trees are rare or absent.

Besides the three types mentioned above, there are a few minor types within the type group 'Tropical moist deciduous forests'. They are some of edaphic variants such as "*Terminalia tomentosa*, forests' found in heavy moisture retaining type of soil and also the post-climax evergreen forests (Example: Karian shola, near Top slip, of Anamalai hills) found as pockets within a climate where the normal climax is deciduous. There are also secondary seral stages in areas where due to constant biotic interference and fire the forest has degraded and grass has made heavy inroads. These secondary types are often termed as Grass Forests (Bourdillon) and Tropical savannah woodland (Burtt Davy).

Type Group: **Littoral and swamp forests**

Neither in representation nor in value this type group is of much importance in Kerala. Only two types of any considerable importance will be dealt with here.

(13) **Myristica swamp forests**

This is a tropical fresh water swamp found locally here and there in the low level evergreen and semi-evergreen areas of the Western Ghats. This type is conspicuous in the valleys of Shendurni and Kulathupuzha reserves falling in Thenmala, Punalur and Trivandrum Forest Divisions. It is found fringing the sluggish streams in flat bottomed valleys, altitude of which is usually below 300m. The ground is usually inundated from June to January and remains wet or moist during the rest of the year. Since this type is associated with peculiar soil conditions (sandy alluvium with high humus content and moisture) within the evergreens this can be considered as an edaphic form of the tropical wet evergreen forests.

The forest is a closed fairly dense evergreen about 5 m. high with clean slender boles standing in mud through which abundant knee roots protrude. The top storeys contain a variety of Myristica species such as *M. Magnifica. M. canarica, M. Laurifolia* and *M. malabarica*. The main associates are carallia *Lophopetalum wightianum, Diospyros embryopteris Lagerstroemia speciosa, Anthocephalus cadamba, Eugenia montana, carallia montana Carallia brachiata, etc.* The under storey consists of Pandanus spp. Except for some species belong to Aroids, *Scitaminae, Cyperaceae* and canes there is very little under growth.

(14) **Tropical hill valley swamp forests**

This type is very limited and localised in occurrence; Eg. Wynad. Unlike the case of Myristica swamps, here the water is moving and presumably well aerated. The site is continuously wet or moist. The steam beds are usually gravelly. The silt and sand in which the trees are rooted are usually rich in humus. The characteristic flora consists of *Anthocephalus cadamba, Machilus macrantha, Elaeocarous tuberculatus. Calamus, Pandanus Alpina, Ficus* often form the under growth.

Type group: **Tropical dry deciduous forests**

This type group is described by Champion as below:—

"The upper canopy in the climax type is a closed though usually rather uneven and not a very dense one. It is formed by a mixture of trees particularly all of which are deciduous during the dry season, usually for several months, though some for a short period only. Most of the species also occur in the moist deciduous forest and reach finer development there,

the height of the dry deciduous forest being typically 15 m. to 23 m. The number of species is much less than in the foregoing types and although a few tend to predominate over any selected area, the majority are not particularly gregarious so that more or less pure associations can usually be traced to soil pecularities or human interference'. The lower canopy is likewise entirely deciduous as although ever-greens or sub-evergreens are present they are inconspicuous and mainly confined to the moist and more sheltered spots. An undergrowth of shrubs is usually present but enough light gets in to permit of more or less grass growth and with burning this tends to become more strongly developed resulting in savannah or park like forms. Bamboos are often present but are not luxuriant. Canes and palms are absent. Climbers are comparatively few but include large woody species which may be locally conspicuous. Epiphytes and ferns are quite inconspicuous.

Many of this species have strong adaptations for xerophytic life, and in drier areas thorny species occur in larger proportion. As a contrast to the evergreen and moist deciducus types leaves of typicals dry deciduous species are pinnate or hairy. Barks of many tree species are very thick and strongly fissured

Dry deciduous areas in general, as their name signifies, are characterised by lower moisture availability and a dearth of perennial streams as compared to moist deciduous forests. During the monscon months when favourable moisture conditions prevail, certain of the larger animals, more typical of moist deciduous forests such as the elephant, sambhur and bison wander into the dry deciduous areas. The spotted deer, which is more tolerant of unfavourable moisture conditions, is one of the fairly typical denizens of such tracts, as are the barking deer, the hare, the jackal, the porcupine, the sloth-bear and the giant squirrel. The regulating influence of the large carnivora is represented chiefly by the panther. The tiger which usually fights shy of the sub-optimal moisture conditions and the proximity to habitation that is often associated with the dry deciduous tracts, is less common in such forests.

Dry deciduous forests possess a relatively richer avian population, the more typical birds being shrikes, bulbuls, drongos barbets, the hopoe, the magpie robin, doves, the green pigeon,

the kestrel, shikra, brainfever bird, jungle babbler, grey junglefowl, peafowl, vultures, besides birds commonly met with in an around habitation such as mynas, kites, parakeets, blue rock pigeons, various flycatchers, etc. .

This type group is represented in Kerala by only one type namely:

(15) **Southern dry deciduous forests**

This type is of limited occurrence in Kerala confined to the dry localities on the leeward side of the Ghats, namely, Walayar in Palghat Division and the Anjanad vally in Munnar Division. Temperature varies from 18°C. or even less in January to about 39°C in April. Annual rain fall general ranges from 1000 m.m to 1400 m.m. As these localities in Kerala receive a good proporation of precipitation from the North-East monsoon dry season is not as prolonged as in the other dry parts of India and the duration of dry season is only 4 to 5 months. The mean annual humidity is about 60%. The topography of the area is gently undulating with moderate to steep slopes here and there. The tract occupied by this type is usually upto an elevation of 800 m., but in Anjanad valley it may go upto 1100 m.

General Floristics

Most characteristic species of this type are *Tectona grandis Anogeissus latifolia*, *.Terminalla* spp., etc. Representatives of many families are included in the crop composition, their chief characteristics being the adaptability to the dry conditions. *Dendrocalamus strictus* is the chief bamboo and forms a common undergrowth. Grasses are also sometimes present, viz., Saccharum, Andropogen, etc. Wherever there was excessive opening or maltreatment, grasses or bamboos have spread and in cases where the retrogression has gone farther, it has resulted in dry savannah.

The floristics of the sandalwood areas at Marayur in the Anjanad valley situated in the leeward side. of the Western ghats are as follows:—

Acacia ferrugines, A latronum, A leucophloea Albizzia monophylla. Bombax ceiba Careyu arborea, Cassia fistula, Choroxyylon · swietenia, Chikrassia tabularis, cipadessa fru tiocsa, Clausena dentata, Dalbergia latifolia, Gmelina arborea, Grewia tiliaeoflia, Gyrocarpus spp., Hardwickia binata, lannea

coromandelica, Azadirachta indica, Protium caudatum, Pterocarous marsupium, Emblica officinalis, phonnix spp., Santalum album, Shorea talura Premna tomentosa, Tectona grandis, Terminalia chebula, Adenanthera pavoniana, Dendrocalamus strictus, Abutilon spp, Carissa spinarum, Dodonaea viscosa, Euphorbia spp., opuntia spp., zizyphus mauratiana Cassia, Strychnos potatorum, etc., Climbers are generally few such as *Abrus precatorius, Acacia, etc.*

There had been considerable biotic interference in the type through grazing, lopping and burning and the forest though taken as a climax, has been subjected to considerable modification. Regeneration of Sandal is in many cases swamped by miscellaneous growth and where grazing is common, regeneration is poor.

Type group: **Montane sub tropical board-level hill forests**

This is a zone representing a climate between that of the Tropical and Temperate vegetational types. However, as Champion remarks, in South India, no marked zonal differentiation of Tropical Sub tropical and Temperate vegetational type is clear. There is no clear intermediate zone of a sub tropical type in between the other two with differing characteristics. The tropical and the temperate zones appear to merge directly into each other. The tropical wet evergreen forests fall off in height and general luxuriance and gradually merge with a zone of temperate forests consisting of a dense lower evergreen type. This transition zone has been considerably interfered with and is now mostly under tea gardens.

However, in the higher hills, for instance, in Nelliampathi, between 1250 m. to 1550 m. floral combination of this type can be seen in the folds of the ridges. This type is also recorded to be present at an altitude between 1350m. to 1550m. above the Silent Valley in Palghat Division, the Anamalai and the Nilambur hills.

The tracts under this type group have a mean annual temperature varying between 18°C. and 24°C. The minimum January temperature falls down to 11°C. The annual rain fall varies between 1900 m.m. to 7500 m.m. The forests are restricted to the hilly areas and at places where the terrain is steep.

The flora is a mixture of that in wet-evergreen forests and the montane temperate, forests, the former element usually predominating.

This type is represented in Kerala by three types of which one is a climatic climax type, another an edaphic type and the third one a degradation stage.

(16) Nilgiri sub-tropical hill forest (Southern sub-tropical hill forests)

This type can be seen in many Forest Divisions such as Palghat, Nilambur, Thenmala, Trivandrum, etc. Portions of Silent Valley in Palghat Division is covered by this type. Here, the flora consists of *Calophyllum elatum, Actinodaphne Bookeri, Litsaea stocksii. Cinnamomum sulphuratum, Canthium dicoccum, Eugenia* ssp., thickets of *Strobilanthes, Gaultheria fragrantissima, Rubus* spp., *Hypericum, Impatiens* spp.etc. In the Anamalai hills, species like *Beilschmedia wightiii, Diospyres* spp., *Flaeocarous* spp., *Myristica* spp., *Euphorobia bougana, Xanthophyllum,* etc. occur along with temperate zone species like *Eurya Japonica, Illex denticulata, Cinnamomum sulphuratum,* etc. In the Nilambur hills, this type consists of *Palaquium, Cinnamomum* spp., *Cullenia, Mesua* and species of *Elaeocarpus*. A small bamboo *Teinostachyum wightii* is common in this altitude. In Thenmala and Trivandrum Divisions this type contains species such as *Eugenia wightiana. Earnottiana, Microtropis wallichianum, Kurrimia indica, Eouphorbia longana, Turpinia cochichinensis, Meliosma wightii, Semecarpus travancorica, lonecera* spp. *Elaeocarous venustus, Machilus macrantha, Neolistsaes zeylanica, Celtis* spp., *Heritiera papilis, Gordonia obtusa, Flicus arnottiana, Eugenia montana, Canthium dicoccum, Memecylon edule, Heotaplacurom wallichianum, Ochlandra spp., Strobilanthes* sp., and *Calamus sp.*

(17) Reed brakes (Ochlandra):

In the sub tropical zone one may come across impenetrable thickets, 3 to 5 m. high, of reed growth with scattered over wood of evergreen trees such as *Vernonia monosis, Eugenia* spp. palaquium ellipticum, etc. This type is sometimes seen on the top of the hills above the evergreen forest and also along the higher slopes at 800 m. and above especially along streams. The reed brakes are generally restricted to moist soils.

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(18) South Indian sub-tropical hill savannah

This is an open savannah forest with tall coarse grass of 2 to 3 m. scattered trees mostly deciduous and fire hardy shrubs. Phoenix humits is particularly characteristic. This type in Kerala is restricted to elevations between 750 and 1700 m. on the slopes of Western Ghats.

This type represents a degradation stage derived from the sub tropical evergreen by clearing or burning or both, and maintained by periodic burning. Only fire hardy species occur.

The grasslands of Peermade, Pamba Devikulam, etc., come under this type. In areas with better type of soil, tall elephant *Grass-Typha elephantina* predominate with occasional *Cymbopongon citratus* Scattered tree growth belonging to *Carva arborea, Emblica officinalis, Terminalia belerica, Pterocarpus marsupium; Dalbergia latifolia, Anogeissus latifolia, Wendlandia notoniana,* occur. On hill tops and in areas with poorer soil conditions, short grasses predominate along with phoenix but with no or little tree growth.

Most of these grasslands have been afforested mainly with Eucalyptus grandis. As a result of fire protection in the afforested areas, natural growth of indigeneous species come up in plenty within the plantations in many localities.

Type Group: **Montane Wet-temperate forests:**

This type group is rare in the State and is confined to high elevations (above 1550 m.) of Silent Valley, Anamudi and Goodrical. There are two types within this type group, one is wooded and the other grasslands.

(19) Southern montane temperate forests

It is a closed evergreen forest, the trees being short boled and branchy, though often attaining considerable girth. The crowns are usually dense and rounded, with entire, coriaceous leaves, which tend to be reddish when young. The branches are clothed with mosses, ferns and other epiphytes. This type is usually found in patches in the protected pockets or declivities in the rolling grasslands.

The area is generally subjected to prevailing wind, mist and clouds characteristic of montane situations well within the tropics and a well distributed rain fall from both the monsoons.

Species belonging to *Lauraceae, Myrtaceae Ericaceae, Tternstromiaceae,* etc., are well represented. Characteristic tree species are *Rhododendron nilgiricum, Vaccinium, Eugenia, Hydro-carlus alpina, Elaeocarpus Munnii, etc., Strobilanthes, Gaultheria, Derberis etc.,* form thick ground flora. Small bamboo species *Arundinaria wightiana and Oxytenanthera* monadelpha also are present.

(20) Southern montane wet grasslands (High level grass lands)

This type is represented by expanse of grasslands in the montane temperate region and is often considered as a degradation stage consequent on the influence and interference of various biotic factors, fire being the most important. Except for a few fire hardy species like Rhododendron and *Gaultheria,* the grasslands of this type are almost treeless. The main grasses found in the region are *Andropogon pertuses, Arundinella* spp., *Ischaemum pilosum, Themeda* spp., *Cymbopogon polyneurous, Eragrostis nigrum, Chrysopegon wightianum, Tripogon* spp., *Pennisetum* spp.. *Aristida* spp. *Dicanthium* spp., etc.

Gradual Decline in the extent of forests

The whole State of Kerala was, in all probability, covered by thick forests in the past. This is evident from the existence of 'Kavus' still seen in the premises of old family houses and certain temples. *Kavus* contain species which are not found elsewhere in the neighbourhood and have to be looked for in the nearby evergreen forests. This points to the likelihood of the *Kavus* being the remnants of the old forests, which being strictly protected and preserved, have retained more or less their old floristic composition.

Gradually small bits of forests were cleared for human settlements and essential agricultural activities. The earliest authentic record about the forest of Travancore is the "Memoir of Travancore Survey" by Lieutenants Ward and Conner. They were in charge of survey works in Travancore and Cochin from 1816 to 1820. About 75% of the land area in question was covered by forests in the beginning of the 19th century. With increase in population and consequent increase in demand for land for housing and agriculture more and more forests were cleared and by the end of that century the extent of forests dwindled to nearly 50% of the land area. The trend in deforestation continued and by 1940 the extent of forests became 35% of the land area. A major portion of the forests cleared

during the period was for the purpose of cultivation of coffee, tea, and so on. During the following 22 years the erosion of forests went on with much more intensity on account of clearance for assignments and also of encroachments. An extent of nearly 22776 ha. of forest land in Travancore-Cochin area was cleared and handed over to Revenue department for assignment. At the same time about 72100 ha. area was subjected to unauthorised occupation. In Malabar area also unauthorised occupation took place on a large scale in the private forests sometimes with the active connivance of the private forest owners themselves. In this respect an extent of nearly 155000 ha. became deforested. As a result of these destructive activities the extent of forest area further reduced to 28% by 1962. During the period between 1962 and 1980 also clearance of natural forests for nonforestry purposes continued mainly to meet the needs of hydel and irrigation projects, raising plantations of commodity crops such as rubber, oilpalm etc., arable land scheme, besides encroachments. The total extent of forest lands including forest plantations grasslands etc., came to 24% of the land area by 1980.

While the actual extent of forest lands now directly under the control of the Forest department is less than 24% of the land area, the official records may give a different picture. As per records the forest area in the state is nearly 11250 sq. km. comprising 9336 sq. km. of reserve forests and nearly 1914 sq. km. of vested forests (the erstwhile private forests now vested with Government). This also includes areas handed over or leased out to various government or quasi-government agencies for different purposes-cultivation of commercial crops, river valley projects, assignment to landless people, arable land scheme etc., and also areas under encroachment. These areas still remain as forest areas in the records since they have not yet been legally dereserved. The net forest area with the forest department was estimated to be about 9400, sq. km. as on 1980 and this accounts for the 24% of the States land area. Even this 24% includes, grassy and rocky blanks, vested forest areas: (a) handed over to Revenue department for assignment, (b) leased out to various agencies for non forestry purposes and (c) handed over or to be handed over to ex-owners as per directions from Forest Tribunals and Courts as per provisions in law, besides encroachments. Thus it can be seen that the extent and percentage of wooded forest area are still less.

The forest area statistics* is summarised in the following statement.

1.	**Forest area as per records**	**11250**	**sq. km.**
	a. Reserve Forests	**9336**	**,,**
	b. Vested Forests	**1914**	**,,**
2.	**Area lost**	**1884**	**,,**
3.	**Balance**	**9366**	**,,**

Break up of item 2 above

1.	Area under encroachment	236	sq. km.
2.	Area under Cardamom Hill Reserve	530	do.
3.	Area under Hillmen settlements	165	,,
4.	Area under arable land scheme	80	,,
5.	Area diverted for other purposes from the area originally included in arable land scheme	80.74	,,
6.	Area under Grow More Food Programme	110.00	,,
7.	Area under Rubber Plantation scheme in the private sector	51.00	,,
8.	Area handed over to different commodity corporations	183.00	,,
9.	Area handed over to Malabar Cements	3.26	,,
10.	Area given to Hydel/Irrigation Projectes	285.00	,,
11.	Vested forest areas restored to ex-owners, handed over for assignment etc.	160.00	,,
		1884.00	,,

Thus during the last few decades, two important trends in the field of forest land use and development have been taking place, (a) the area under forests has been declining due to diversion of forest land for nonforestry purpose and (b) the man made forests. The extent of plantations has increased to more than 1.5 lakhs hectares.

***Note:—the figures are purely provisional.**

In Kerala as well as in the rest of the country, forest resources are depleting at a fast rate. The destruction of tropical forests leads to severe and perhaps irreparable damage to our ecosystem, thereby adversely affecting the protective, regulative and productive functions at the ecosystem levels. As already indicated the main factors that cause depletion of our forests are diversion of forest lands for agriculture, irrigation and power projects, industrial establishments, roads, settlement of evicted persons, unauthorised occupations, etc.

A Brief History of Forest Management and Policy

Scientific forest management in India is nearly a century and a quarter old. During this period the pattern of forest management has been undergoing changes mainly due to the impact of significant socio-economic forces. Expansion of population resulted in the extensive destruction of forests which in turn led to the realisation that the forests should be consolidated and conserved. In India, consolidation and conservation started in 1855.

In 1856, Cleghorn was appointed as Conservator of Forests, To Cleghorn goes the official recognition as the "Founder of the Forest Conservancy in India". In 1859, a Forest Department was formed for Wynad and Mr. Hunter was posted in charge.

A phase of conservancy of forests thus started by middle of the last century. The dawn of Indian Forestry emerged with the appointment of Dietrich Brandis in 1862 to organise Forest Department in the provinces of British India. The development of Forestry in India is largely based on the technical guidance of Brandis.

Rules were promulgated for this purpose. The first India Forest Act was enacted in 1865 and reservation of forests commenced since that year. The Forest Act was modified and re-enacted in 1878. This enabled to take concrete steps for demarcation, protection and conservation of Forests.

Forest surveys were also undertaken by the various provincial forest departments and maps were prepared. To have uniformity in the preparation maps the Government of India centralised the survey and preparation of maps by creating a Forestry Survey Bureau in 1872 under the control of Inspector General of Forests. Later on the work of preparation of maps was transferred to Survey of India. Survey of India completed the mapping of the forests between 1888-1900.

Regular scientific forest management started in various places in India only during the period 1871-1900. Forest settlement operations and preparation of working plans commenced in different parts of the country during this period. By 1920, almost all the States had regular working plan organisations to take up preparation of working plans.

Till the Second World War there were no big wood based industries except the saw milling to make any great and difficult demand on forests. Defence needs subsequently imparted a strong impetus to the development of some forest based industries, such as plywood. Many other forest based industries with varying capacities sprang up to meet the demand of the growing population. The clamour for industrial expansion and national development became greater and greater year after year. The need and necessity for wood and other forest raw materials became well recognised. The need for protecting, conserving and developing the forests to give a sustained yield of forest raw materials was better understood.

In early days of forest management, forests were mainly considered as a source of timber and fuel but gradually the importance of forests as a source of valuable minor forest produce such as bamboos, reeds, canes, spices, medicinal plants, essential oils, fibres, gums, honey, waxes, resins, tanning materials, ivory, hides, etc., was better recognised.

Wild Life as an integral part of forests was appreciated and wild life management was taken up with earnestness on a scientific footing. Importance of wild life as a means of recreation and as a source of important produces, and the need to preserve and protect them dawned on the minds of authorities very late. Game laws were enacted and game rules formulated as a means of protection. Game sanctuaries and National Parks were opened and zealously guarded for preservation of wild life.

It has long been recognised that forest management should not merely be production—oriented at the expense of other benefits associated with protection. Consequently land management, soil conservation and watershed management became important in forest management. Forests as a perennial source of water and many other environmental benefits were more and more understood.

Various developmental schemes such as hydro-electric and irrigation projects, roads, railways, agricultural projects, rehabilitation of landless people, tourism, etc., began not only to

encroach the sanctity of the forests but also to reduce the extent as well. This situation necessitated the need for intensive management and stricter protection measures.

Thus forest management in the present day context is not as simple as it used to be in the early decades of the century. In general, proper conservation of a country's forests and their wise management requires breadth of vision and depth of insight and should be guided by well-thought-out policies.

Government of India has revised and enunciated its Forest policy in 1952 and are presently engaged in further revision. The 1952 policy is based on the following prime needs.

(1) The need for evolving a system of balanced and complementary land use, under which each type of land is allotted to that form of use under which it would produce most and deteriorate least;

(2) The need for checking (a) denudation in mountain regions on which depends the perennial water supply of the river systems whose basins constitute the fertile core of the country, (b) the erosion progressing apace along the treeless banks of the great rivers leading to ravine formation, and on vast stretches of undulating waste lands depriving the adjoining fields of their fertility, and (c) the invasion of sea sands on coastal tracts, and shifting of sand dunes, more particularly in the Rajaputana desert;

(3) The need for establishing treelands, wherever possible for amelioration of physical and climatic conditions promoting the general well being of the people;

(4) The need for ensuring progressively increasing supplies of grazing, smallwood for agricultural implements, and in particular of firewood to release the cattle dung for manure to step up food production;

(5) The need for sustained supply of timber and other forest produce required for defence, communications and industry and:

(6) The need for the realisation of the maximum annual revenue in perpetuity consistent with the fulfilment of the needs enumerated above.

The National Forest Policy also maintains that at least one-third of the total land area should be under forests, in hilly regions 60% of the land area should preferably be under forest cover.

History of Forestry in Kerala

After the decline of the Cheramans, their kingdom was divided into many principalities and ruled by Rajas. Forests, ruled by Rajas. Forests, were considered noman's land and later they were taken possession of by the feudal lords (or Naduvazhees) who owned allegiance to the Rajas. The feudal lords entrusted portions of their land to local chieftains.

With the growth of the Arab trade and later the coming of the Europeans a flourishing timber trade also developed with the Western and Arab Countries. During these days large forest areas were opened and the 'Virginity' of the forest was violated. Magnificent trees of teak, rose wood, sandal and ebony were felled and exported. Various hill produces and spices like cardamom, pepper, etc., earned international reputation.

By the end of 18th Century, most of the forests came to the possession of the Maharajas of Travancore and Cochin. In Malabar, the lands continued to be in the possession of small rulers. After Tippu Sultan's conquest in Malabar in and later his defeat in 1792, the Malabar portion of Kerala became a British territory.

(i) **Malabar**

Though Malabar became part of British territory, the British Government could not take possession of the forests due to unsettled condition of the country, and taking advantage of the situation the large land owners took possession of the forests. Even then the forests were free to all. But species such as teak, sandalwood, etc., which had a recognised value as goods of export were proclaimed as royal trees. Tippu Sultan was the first to create such a monopoly.

Large quantities of teak were supplied to the Bombay Naval Dockyard for ship building and to the Ministry of Works Department at Wellington and other places. During these extraction "plums were most effectively picked out of the cake". Felling of trees were done indiscriminately and removal of valuable timber was almost wholesale. Teak continued to be in high demand for ship building. With the introduction of railways the demand for timber increased considerably.

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In 1805 the Royal Navy suffered for want of timber and hence an enquiry was undertaken about Malabar teak supplies. As a result of the findings of the enquiry committee, teak was declared as a royal tree all over. The first Conservator (a Police Officer by name Captain Watson) was appointed in 1806. He developed monopoly in the timber extraction of west coast and exterminated the rights of private individuals. But against this monopoly private forest owners like Raja of Nilambur complained. In 1823 the post of Conservator was abolished.

The situation slowly deteriorated. Forest areas got reduced by fire, axe and shifting cultivation. Government of India became alarmed at the depletion of the forests and diminution of timber supplies. Therefore, the first step towards the commencement of a system of forest management in British India was taken in Malabar District. In 1828,, Mr. Sheffield, the then Collector of Malabar proposed to the Government total prohibition of felling of young teak trees. The Indian Navy Board, in 1831, recommended the resumption of Conservatorship. In 1842, the court of Directors recommended planting of teak to safeguard its future supplies.

Conolly, Collector of Malabar, suggested that about 1,20,000 teak trees should be planted in succession for 60 years to meet the minimum annual demand, assuming that a teak tree should take 60 years to attain maturity. Since there was no forest under the control of the Government, suitable lands were either purchased or acquired in Nilambur for this purpose.

In 1840, Mr. Conolly suggested his novel idea of planting teak and in 1842 he put his precepts into practice (by artificially planting teak) with an object to "replace those forests which have vanished from private carelessness and rapacity—a work too new and too expensive and too barren of early return to be over taken up by the native proprietor", thus sowing the seeds which later-established itself into the now world famous Nilambur Teak Plantations. Collector Conolly rendered yeomen service during this period by initiating the formation of the first teak plantation in 1842 at Nilambur and in creating a small Forest Department costing Rs. 340 per month. He also framed certain local rules for the Department.

To assist him in this new venture he advocated the appointment of a Sub Conservator "with knowledge of arboriculture" to be placed under the Collector. This was approved by the Government and appointment was made in 1841 which marks the

first step towards the establishment of separate staff to look after the management of the forests. The work was beset with a number of difficulties and therefore the European Officers appointed left the job. In 1844, he found in Shri Chathu Menon a fitting assistant and appointed him as a Sub Conservator. Shri Chathu Menon, in the face of hardships, fever and frequent dearth of provisions, continued in sole charge of the plantations till his retirement in 1862. The Nilambur Teak Plantations are magnificent monuments for the indomitable industry of the veteran pioneers—Conolly and Chathu Menon.

Later on, forest resources were thoroughly investigated and measures were undertaken to combat the situation of excessive fellings. In the years that followed, the foundation of scientific forestry was laid; and large extent of forests were reserved and large extent were also taken out on lease from private owners. Suitable areas were clearfelled and planted with teak and in other areas removal of trees was done based on scientific principles.

During this period, the forest department continued to be under the administrative control of Collector. The forests were worked on stump fee (Kuttikanam) system. Trees were cut indiscriminately with no attempt to improve the forests. Most of the private forest owners permitted teak to be extracted, without discrimination of age or size in consideration of the stump fee (Kuttikanam) of Re. 1 paid to the owner on every tree felled.

Before 1873, there was no timber extraction on a planned basis; in 1873, departmental extraction of timber like Teak, Rosewood, Xylia Terminalia tomentosa, etc., was carried out from natural forests. Thinnings of teak plantations were regulated by a scheme (for period 1885 to 1895) for the first time by Colonel Campbell Walker.

In Madras (Malabar formed part of Madras Presidency) a separate forest Act (Madras Forest Act) was passed in 1882 and reservation of forest was taken up in 1885. But, by that time many private claims had cropped up involving prolonged litigation, which ultimately led to the loss of much valuable forests and this in turn gave birth to the "private forests of Malabar". The 'Private Forests' in its wake brought problems of protection and preservation, ultimately leading to the enactment of the Madras Preservation of Private Forests Act, 1946 for effecting some control in the administration of these by Government.

With the passing of the Madras Forest Act in 1882 administration of these forests became systematised. By the end of the 19th Century, forests were put under definite scheme of management or working plans. The year 1890 marked the abolition of loose permit system and the recognition of the necessity of exploiting the forest resources under regular working plans. In 1895 the first Forest Working Plan for the forests of Nilambur was prepared by Mr. P. M. Lushington and ever since these forests were worked only under sanctioned working plans.

Though forest administration was entrusted to specialised organisation from 1856 the Forest Department itself became a separate entity of Government only from 1919 when Mr. Gox was appointed the first Chief Conservator of Forests, Madras State.

In the field of Research as well, early start was given in 1919. A post of Research Officer was created in 1919 with headquarters at Coimbatore (which was later transferred to Ooty in 1924). Many important Silvicultural Research works were started in Nilambur and Wynad and yielded very fruitful results.

Attempts to convert all suitable deciduous areas into teak plantations continued. The evergreen forests were worked for large size timber on selection system. Attempts were also made in 1923 to introduce mechanical logging under American method of lumbering with tractors and skyline skidders in the Chenat Nair Reserve. But it was subsequently given up as it proved a failure. The Second World War caused a great drain on these forests on account of special war fellings.

Private forests of Malabar (See vested Forests)

(ii) Cochin

Upto the middle of 18th Century, the forests of Cochin area were under the possession and control of the Naduvazhees. Most of the forests came to the possession of the state between the years 1760 and 1780. After 1800 the lease system was brought into vogue for extraction of timber. Fixed forest areas were leased out for definite periods for lump sums to the contractors. This resulted in over exploitation and considerable wastage. In 1813 Colonel Munro was appointed as Superintendent of Forests and he introduced departmental system of working, realising inherent defects in lease system, but it was confined to teak only. All other timbers were free to people who were allowed to remove them on payment of certain transit duties. For teak, Royal rights existed. Teak was almost the only species extracted and due to its large scale extraction the species became almost extinct.

An attempt therefore was made in 1818 to restock the depleted teak forests by dibbling several lakhs of teak seeds all over the forests.

The past history of the Forest Department of Cochin dates back to 1835, when Mr. J. A. Kohloff was appointed as Conservator of Forests and he organised a Forest Department and introduced the departmental system of working for monopoly trees, and permit system for firewood and minor forest produces. Rosewood and Ebony were also declared as Monopoly trees in 1837, and for the first time seigniorage or Kuttikanam for junglewood was levied in 1840.

Catching of elephants was also practised from early days and both kheddah and pit method of capturing were practised.

In spite of these improvements, timber extraction was carried on in a reckless manner both by Department and permit holders. In 1853 work of timber extraction was commenced in Parambikulam area and it was stopped soon after. Working of forests principally on permit system for all produce other than Teak, Rosewood, Ebony, firewood and M. F. P. resulted in over exploitation. Teak plantations of Palappilli was started during 1872. Over exploitation resulted in the fall of revenue to an appreciable degree. In 1897, Mr. Foulkes from Madras was invited to inspect the State forests and to make proposals for improvement. His report, 'suggestions regarding forest administration in the Cochin State', embodies various suggestions and stressed the need for appointing trained Forest Officers. Accordingly in 1899 the services of Sri Alwar Chetty was borrowed from Madras and it was during his time that the system of unregulated felling by permit holders was put a stop and departmental marking of trees prior to felling was insisted upon. Special rules relating to forests were evolved and the Cochin Forest Act was enacted in 1905, on the lines of the Madras Forest Act.

After the Cochin Forest Act of 1905 was brought into force, unregulated felling of both monopoly as well as junglewood trees were stopped. Trees for felling were ordered to be marked by superior officers and the work of collection was given to the lowest bidder. Forests were divided into territorial divisions and administration was entrusted to qualified hands. With progress of time attempts were made to restock the areas of forests by closure of certain areas for fixed periods, by experimental regeneration works, improvements, felling, etc.

During the period of Alwar Chetty, arrangements were made for the exploration of interior forests to suggest methods of extraction of teak, rosewood and other valuable trees from inaccessible areas. Parambikulam, an area situated about 80 km. from Chalakudy to the interior of the forests, then contained large sized teak, rosewood, etc. With the assistance of a German Engineer, a Tramway was opened in 1907 from Chalakudy to Parambikulam over a distance of 80 km. to facilitate extraction of large sized teak and rosewood.

In 1908 Diwan Banerjee abolished the Divisions as units of administration and introduced Range system. Forests were divided into 3 ranges with Sub-ranges under them. In 1936-37 a change was effected and an Assistant Conservator of Forests was appointed. Some of the routine work of the Conservator was delegated to him. Sub Ranges became the units of administration and Rangers were relieved much of their paper work. In 1944, the Divisional system was again restored, retaining the Sub Ranges.

In 1921, a working plan was prepared for part of the forest area but was not brought into operation and the forests continued to be managed under Annual Plan of Operations. Till 1928 rosewood, teak and ebony were monopoly trees but the monopoly was abolished in that year. Between 1940 and 1950 large clearances of forests were made for temporary food cultivation and extensive encroachments have resulted in denudation of vast forest tracts.

The forests were put under regular working plans, after its integration with Travancore State.

(iii) Travancore

Commencement of Forest Management in Travancore is traceable to the close of 18th century when Raja Kesava Das opened a timber depot at Alleppey which was a major port of the State at that time. During the close of 18th Century large supplies of teak from Idiyara Valley were made to the British Navy for ship building. About the working of the forests of Travancore, the earliest authentic information is available from the Memoirs of Travancore written by Lieutenant Arthur in 1810 and the Memoirs of Lts. Ward and Conner who were employed on the survey of the country from 1817 to 1820. In the early years of 19th Century it had been customary to lease each river for its timber (apparently teak) and this had nearly ruined the forests. At the time of the visit of

Lts. Ward and Conner the Government had begun to work the timber on their own account. Felling of trees and transport to Alleppey were done at the supervision of a Commercial Agent who combined in him the duties of the Conservator of Forests also. These operations were entrusted to Captain Robert Gordey of the Bombay Engineers, who then held the post of Commercial Agent at Alleppey. Extraction of teak, which was a royal tree, alone was undertaken then, while all other timber was free to the people except that it was subject to a light river duty when conveyed by water.

After this V. V. Munro was appointed as the first independent Conservator of Forests. Management of Forests was mainly for teak; for every 10 teak trees fit for felling 2 were left standing for seed and for every tree cut 10 trees were to be planted.

Till 1844, teak was the only monopoly timber claimed by the State but in that year rosewood also was made a monopoly, and no restrictions were imposed on felling of junglewood. In 1854 seigniorage rates were fixed for junglewood and removals were allowed only by cover of permits. Permit holders were free to cut indiscriminately without any check. They used to fell many trees before making their selection. Under this system any person could get a permit for any quantity of timber on payment of a fixed seigniorage and cut any quantity anywhere he liked under no supervision.

The early days of the 19th century also saw the demolition of vast tracts of forests for rubber, coffee and other cash crops and the forests suffered from the acquisitive hands of man. Many of the estates were subsequently abolished. Many Coffee estates were ruined by the fungus pest *Hemileia vastatrix* and much of the land planted was very steep or otherwise unsuitable for coffee.

To prevent over-exploitation of valuable timbers, ebony and sandalwood were declared as monopoly in 1865. The rapid disappearance of teak and blackwood (rosewood) having become apparent, experimental planting of teak was commenced in 1865 at Vemburam as per the idea of Raja Sir T. Madhava Rao. Regular plantations started from 1867 onwards both at Malayattur and Konni, the first plantation at Aruvapallam at Konni having a wide espacement of 23' x 23'. In 1866 a proclamation was issued prohibiting the felling of teak, blackwood, ebony or any tree planted or growing on the banks of rivers. Before 1870 teak was worked down on contract system

and in that year contract system was abolished and Government departmental working commenced. Upto 1875 teak and blackwood were collected departmentally and delivered at Alleppey. In 1875, for the first time, collection and delivery was given on contract for supplying teak to a Bombay firm-Messrs Wallibhoy Kaderbhoy & Co. The contract lasted for 37 years and was terminated in 1912. In 1881, departmental collection was practically stopped and contracts given even *for collection of small sized timber which was not felled* before.

During this period hill cultivation was causing great loss, and in 1870 rules were laid down for hill cultivation. But in spite of the restrictions the denudation of the forest continued.

The permit system introduced for working of junglewoods in 1854 was giving room for many malpractices. It was abolished in 1884 and depot system of sale was introduced. Heavy and wasteful felling with uncontrolled shifting cultivation resulted in such thorough depletion of forests that it could not be long overlooked. In 1887, the seigniorage system was reintroduced with arrangements to check the timber in the forest. In 1883 a special commission was appointed to discuss the management of the forests and to suggest measures for better conservancy of the forests. Based on the Commission's recommendations, the first Forest Act in the State came into existence in 1887.

Mr. Bourdillon was appointed in 1886 to make a thorough examination of the reserves and he submitted his report in 1892. Mr. Bourdillon also took charge as Conservator of Forests in 1891. The Forest Department was reorganised in 1896-97 on the lines of British administration. The State was divided up into 4 Divisions and further split into Ranges. Systematic working of the forests was introduced giving priority to the conservation of the forests. In 1899 a rule was passed laying down the girth limits for removal of trees and no trees below that limit were to be felled. The permit system which was reintroduced in 1887 was abolished and depot system was again introduced. The Depot contractors could transport timber to the depot only under cover of a pass.

To check the menace of shifting cultivation from hillmen, rules regarding the management and control of hillmen residing within the limits of the Reserved Forests were passed

in 1904. Regular series of plantations of teak was continued and in the year 1907 it was first attempted to compile a comprehensive report on the Plantations in the State and to draw up a scheme for thinning. In 1916, a plantation Division with headquarters at Punalur was formed to place all the teak plantations of the State under one Special Officer. To put the forests under more scientific treatment working plans were prepared and the first plan was prepared between 1912 to 1920 for the major 'Forest Working Circles'.

All this while, Teak, Rosewood, Sandalwood and Ebony continued to be royal trees. These 'Royal Trees' belonged to Government wherever they were found growing, the owners of private lands being eligible to get only what was termed 'Kudivila' or a portion of the proceeds when the trees were cut and disposed of by Government.

Owing to continued representations in the Sree Mulam State Assembly it was decided in 1932 that the monopoly over royal trees be abolished in the course of a fixed number of years during which period the forest department would remove all the royal trees that stood on private lands and leave to the people whatever that came up thereafter. For the purposes of exploitation of these royal trees from private lands the State was divided into three tracts viz., (1) a western tract, (2) a middle region and (3) an eastern tract. The extraction of the trees from the first two tracts was completed in the course of 6 to 10 years but the extraction of trees from tract III continued even after the reorganisation of the State and it was only in January 1958 that Government monopoly over the royal trees was finally lifted and the Forest Act suitably amended.

This whole-sale extraction of royal trees from private lands should not lead one to the conclusion that teak in the reserved forest was preserved. Extraction of teak was particularly heavy in all the accessible areas. The finest teak in Travancore was to be found on the hills at an elevation of 300 m to 600 m. Idiyara Valley and Pallivasal unreserves in the then Malayattur Division and the lower portions of the Cardamom Hill Reserves in Malayattur and Kottayam Divisions can be said to be the celebrated home of natural teak in Travancore. Bourdillon in his 'Report on the Forests of Travancore' mentions that about the beginning of the 19th Century a teak tree felled in Idiyara Valley measured 7 feet

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(2.1m.) in diameter at the base and 26 inches (0.65 m.) in diameter at 70 feet (21m.) from the butt, thus giving an yield of nearly 900 cubic feet (25.7 cu.m.) of timber. Teak trees measuring about 2.5 m. in diameter at breast height were also reported to have been available in the once glorious Pallivasal Unreserve in the year 1948.

The Pallivasal unreserve and the adjoining portions of the Cardamom Hill Reserve were perhaps the richest untapped timber lands in State. Teak trees over 375 cm. girth were normal, of 500 cm. were not rare, of 625 cm. were not exceptional But with the start of the Grow More Food Campaign and the vigorous extension of cultivation into forest areas, these timber lands were soon occupied, broken up, cleared and cultivated. The constitution of these areas was also peculiar in that two departments exercised control over them, the lands belonging to the Revenue Department and the trees to the Forest Department. Thus, extraction of very large quantities of teak and other timber became obligatory.

While thus the story of heavy exploitation of teak from all over the state-reserves, unreserves and private lands presents, a rather disquieting feature, a survey of the planting activities in the State, is a matter of consolation.

It was at Vemburam, a small island on the Periyar river about four miles east of Malayattur that the first attempt at teak planting was made in the year 1865. Though this attempt was in itself a failure it paved the way for regular plantings the next year onwards both at Malayattur and Konni. Following the practice at Nilambur, seedlings were raised in what were termed dry weather nurseries in February and 4 months old seedlings were planted out in pits during the month of June. This system was soon given up. Nurseries were raised during the rainy season and one year old seedlings were planted out during the following year.

The espacement adopted was varied, viz. 12' x 12' 12' x 6", 8' x 8' and even 15' x 15'. In Adienkavu a spacing of 5" x 5" was also tried and in Konni even an espacement of 23' x 23' was experimented upon. Though a wider espacement of 12' x 6' or 8' x 8' was found suitable, in good localities a uniform spacing of 6' x 6' came to be adopted probably because the lands selected for planting were not uniformily good.

It will be interesting, in this connection, to note that the technique of 'stump planing' was first adopted and perfected in Travancore under the guidance of the pioneer Forest Officer, Bourdillon, who was then the Conservator of Forests. The first attempt at stump planting appears to have been made in the year 1891 as will be evident from the following extract of the annual inspection note of Mr. Bourdillon. "I visited Ariyankavu on 12th June 1891 and finding that there was a large number of plants in the nursery I ordered a small area to be planted out and accordingly 4560 plants, *stumped on account of their large size* were set out at a distance of 5' x 5' covering about 3 acres".

Again in the following year another 36 acres were planted in the same locality with stumps obtained from the previous year's nursery. That from 1893 onwards stump planting had been the accepted practice in Travancore is seen from the 'instructions for the opening and maintenance of teak plantations' issued by Mr. Bourdillon on the 31st December, 1893. These memorable instructions are extracted below:

"If the plants exceed the thickness of a pencil they may be stumped ie., cut back to a distance of 6" from the collar. Stumps are particularly useful where the monsoon rains are likely to be light, and in the drier regions stumps should invariably be planted in preference to smaller plants. To obtain plants large enough to stump, the seed must be put down in the nursery six months earlier than usual. In putting out the plants they should be firmly placed in the ground but not too deeply. They should in fact be not planted deeper than they were when growing in the nursery".

Thus, Bourdillon occupies a place of honour in the history of teak plantings in Travancore. Long before the technique of stump planting was experimented upon in the adjoining State of Madras, Bourdillon had set out a definite practice in adopting the technique throughout the State. The impetus that he gave to teak planting in Travancore was, therefore, tremendous, and in a short period of 15 years 1113 hectares (2750 acres) were planted with teak. Perhaps what Conolly was to Nilambur, Bourdillon was to Travancore; but the pity is that we have yet to preserve a plot of his plantation to honour him.

In the year 1922 a fresh momentum was given to teak planting by the introduction of what is called 'taungya system' by which along with the raising of the tree species

cultivation of agricultural crops was also done during the first one or two years. The first successful attempt at taungya was made by M. Velu Pillai (Deputy Conservator) in Konni in the year 1922 when he raised 44.5 hectares (110 acres) at Kadiyar and 39.4 hectares (97.50 acres) at Chengara under the taungya system. In spite of early misgivings the attempt was success that all subsequent plantings in Konni were under the taungya system.

Two factors contributed to the success of taungya system in Konni viz. the suitability of the forest lands for paddy cultivation and existence of an agricultural population very close to the forests with an immemorial tradition for hill cultivation. Though these conditions were not found in the same measure in other divisions in the State, taungya system was generally adopted as the method of raising teak plantations through out the state. The result was that in a short span of 5 years (1927-1932) as much as 1417 ha. (3500 acres) were planted.

As the taungya system developed, not only was all works such as clearing and burning, lining and staking, planting, supply of failures, and the first weedings were carried out by the taungyadar at his own cost but a premium was paid by him to the Government for the right of cultivation in the area. In the year 1945 another new clause was added to the taungya agreements by which the taungyadar was called upon to raise a teak nursery also. Cost of formation was thus not only reduced to nil but the premium paid for the right of cultivation was a net gain to the Government in addition to a fully stocked plantation! In Konni Division the usual rate of per premium obtained during auction was over Rs. 200 per acre and in 1944 the rate rose up to Rs. 390 per acre. This was perhaps the danger point. Gradually the emphasis shifted on to the premium and, where there was keen competition in such auctions resulting in very high prices being paid for the right of cultivation the incentive of the taungyadar was invariably diverted to minimise his expenditure on planting works. The enforcement of the provisions in the agreement to penalise taungyadar for his failure to do the planting works satisfactorily had only increased the dues payable by him to the Government but had not helped, generally, in making the plantation a success. In short, what was once an easy and efficient system became a real detriment to the plantations.

The position described above has then been retrieved. All planting works were got done departmentally and the

taungyadar's job was only to do the cultivation after the planting was over. This welcome change had, of course, brought about a greater amount of departmental activity and the need for the formation of special plantation ranges keenly felt. The idea was first moved at the Forest Officers Convention held at Trichur in January 1959 and was generally accepted.

During the Second World War large timber supplies were undertaken and it greatly upset the normal working of the forest. Simultaneously there was another problem to be confronted. Population increased many fold, resulting in relentless pressure on forests to secure more land for cultivation. Large areas of forests were soon occupied, broken up, cleared and cultivated in the guise of food production.

Wild life management of the State also deserves mention. Lt. Arthur in his Memoirs (1810) mentions that at that time. Government used to allow people to cut pits for capturing elephants on payment of a tax (Inam) per pit and the elephants thus taken apparently became the property of the person who dug the pit. After 1810, Government also started digging pits but still allowed Inam pits. It was not till 1875 that Inam pits were prohibited. In 1869 rules were laid down prohibiting shooting of elephants. Between 1876 and 1884 Kheddah system was practised and about 100 elephants were caught. Later on Kheddah scheme was abandoned.

Along with over exploitation of forests on the one side, wild life wealth of the State also was getting reduced. Though the Conservator of Forests brought it to the notice of the Government as early as 1926, it was only in 1933 that a Special Officer for the preservation of wild life in the forests of the State was appointed with Trivandrum as Headquarters. Later on the catchment of the Periyar Dam was declared as a Sanctuary and Peermade made its headquarters. Periyar Sanctuary is now one of the finest in India and the State can be rightly proud of it.

There has been of late an awareness, though as yet feeble, of the need to preserve and protect nature's resources, including wild life. This is particularly so after the adoption of a global conservation strategy in 1980 following realisation of the threat posed by over-exploitation.

After India signed the Convention of International Trade in Endangered Species (CITES) in 1973. enforcement of the Wild Life Conservation Act of 1972 was tightened to save species

facing extinction because of indiscriminate killing for food, medicinal purposes, beauty aids or for trophies. Special projects were launched to identify the natural habitat of such species and set up a string of sanctuaries and parks. Large forest areas were also identified as biosphere reserves to be left untouched and undisturbed so as to maintain the ecological balance.

Kerala has now nearly one-fifth of its reserve forests as wild life sanctuaries, a comparatively high figure indeed. But this does not mean that these protected forest lands are free of human interference. There is timber extraction and other forms of exploitation. Even private holdings exist within the sanctuaries. Still, they enjoy comparatively a better status among the reserve forests of the State. Cash crop plantations in forests cause constant human interference in the habitat of wild life. Use of firearms for crop protection creates problems to those protecting the sanctuaries.

Eravikulam National Park

It was against this background that the creation of a national park with statutory safeguards against exploitation of forest wealth and accrual of private rights was thought of. That was how the Eravikulam National Park at Munnar on the High Ranges in Idukki came into being. The 105 sq. km. area at an elevation of 1,800 to 2,400 metres, has rolling grasslands and shola forests and spectacular rock formations and forms part of the huge chunk of forest area taken over by the Kerala Government from a Private Plantation Company in 1971.

Thanks to the area's virtual inaccessibility, the luxuriant vegetation there had remained untouched. It is the home of the shy and fleet-footed Nilgiri tahr, a kind of mountain goat. A rare species which was on the verge of extinction, it is the main fauna in the park, and moves about freely in herds of 20-50. Even before the forest was taken over, it had enjoyed full protection from the Company mainly because of the keen interest shown by the managers of several near by estates in the preservation of wild life. They had formed the High Range Game Preservation Association some 55 years ago with a view to protecting and preserving the species found only on the slopes of the South Western Ghats.

There is a small natural pond on the southern side of the part at an elevation of nearly 2,000 metres from which originates

a small river. The water cascade adds charm to the park. The Anamudi, the tallest peak in South India is on the southern boundary of the park. The panoramic view of the foot-hills from the base of the Anamudi is incredibly beautiful.

The formation of the park in 1975 marked the beginning of the efforts to conserve the Nilgiri tahr. A detailed project report was prepared and central assistance sought to implement the scheme aimed mainly at improving the infrastructural facilities for better management of the park and protection of the fauna from poachers, grazers and smugglers of forest produce.

Human interference is minimum in the park because of the absence of jeepable roads, private holdings or easily accessible bridal paths. The park can be reached only by the eight kilometre stretch of path from the Vagvurrai estate where unauthorised entry is prohibited. There is no forestry operation. Entry of nature lovers to the park is permitted, but only with the sanction of the Wild Life Warden at Munnar. The pond in the park has a good fish population and was the angling spot of the Company's executives. A 100 year old well-furnished but small building in the middle of the park is the rest house to those who wish to spend a few days there enjoying nature in all its glory.

Though human intrusion has been totally controlled in the park, the tahr faces threat from predators, mainly wild dogs. A few tigers have also moved into the park from the adjoining forests because of the availability of plenty of game and safety from poachers.

Other wild animals have also adopted this protected area as their home. This is proved by the large presence of sambhur, Indian gaur, and elephants and a few black panthers. Indeed, it is unique for its heterogeneity of fauna and flora and an enchanting place on the roof of the Western Ghats.

There are eleven wild life sanctuaries in Kerala—Periyar Parambikulam, Wynad, Idukki, Neyyar, Peechi-Vazhani, Peppara, Aralam, Chinnar, Shenthuruni and Chimmini and one bird sanctuary at Thattakkad. Iravikulam in Idukki district has been declared as a National Park. About 90 sq. km. area in Silent Valley in Palghat district is also declared as National Park. The Periyar Tiger Reserve in Idukki district has been included as one of 15 National Tiger Preservation Projects under the Operation Tiger Project implemented by the Government

of India from 1977. In this project nearly 777 sq. km. area in the revenue districts of Idukki and Pathanamthitta are covered.

The other Wild Life Sanctuaries are: Parambikulam in Palghat with an area of 285 sq. km., Wynad in Wynad district 344 sq. km., Neyyar in Trivandrum district 128 sq. km., Idukki in Idukki district 76 sq. km., Peechi-Vazhani in Trichur district 125 sq. km., Peppara in Trivandrum with 53 sq. km., Aralam in Cannanore district with an area of 5500 hectares, Chinnar in Idukki district with an area of 90.4 sq. kms., Shenthuruni in the catchment area of the Kallada Irrigation in Quilon district and Chimmini in Trichur district each having an area of 10 sq. kms. The Thattakkad bird sanctuary in Idukki district which has 25 sq. km., came into being 1983.

Vested Forests

By about 1945 the total extent of forests in the erstwhile Malabar area was nearly 4984 sq. km. which comprised 1608 sq. km. of Government Reserved Forests managed by the Forest Department, about 220 sq. km. Government Revenue Forests managed by the Revenue Department and nearly 3,156 sq. km. private forests, (i. e.), forest lands owned by private individuals In 1945, the Madras Government conducted a survey of the private forests of Malabar and it was found that these forests were owned by about 116 individuals and the extent varied from 40 hectares to 40,000 hectares. Frequent clashes between Royal families resulting in annexation of lands, entrustment of lands by the princely rulers to local chieftains, presentation of lands to favoured individuals for certain services rendered, surrendering of small lands to neighbouring chieftains, changes in the joint family system, etc. resulted in splitting up of forest areas, which were at that time comparatively valueless, into numerous ownerships.

With increase in population, the demand for timber for construction, and land for cultivation of food crops increased, and exploitation of these private forests started. The outbreak of the Second World War brought in a boom in timber business and consequently doomed these forests due to indiscriminate fellings and over-exploitation by timber merchants.

Realising this situation the Madras Government, in 1946, with the object of checking destruction of private forests, introduced the Act called "Madras Preservation of Private Forests Act" which provided for certain detailed formalities to be

followed in the working of these forests. Unfortunately, there were several weak points in this Act and the actual enforcement of the same was found ineffective. In the nineteen forties, due to increase in demand for timber especially for war purposes and also due to emigration of people from Travancore to Malabar in search of land, destruction of private forests continued with added vigour.

By the nineteen sixties, out of about 3156 sq. km., of private forests that existed in 1945, nearly 50% became badly denuded or converted into agricultural lands. Most of the areas (with certain exceptions) that still remained as forests were so heavily exploited that it was not possible for the owners to manage them as forests economically. This situation ultimately led to the promulgation of the Kerala Private Forests (Vesting and Assignment) Act, 1971 by which private forests in the State of Kerala were taken over by the Government.

The private forests in the State of Kerala were taken over by the Government as per Ordinance No. 14|71 promulgated by the Governor of Kerala on 10th May, 1971. As per the ordinance all private forests in the State stand vested in the Government with effect from that date. This ordinance was later replaced by the Kerala Private Forests (Vesting and Assignment) Act, 1971 (Act 26 of 1971). The constitutional validity of this Act was challenged in the High Court by the owners who were deprived of their private forests, and the High Court, on 21st June, 1972, declared that the Kerala Private Forests (Vesting and Assignment) Act, 1971, was unconstitutional and void, the State went on appeal to the Supreme Court against the decision, and on 18th September, 1972, the Supreme Court declared that the Kerala Private Forests (Vesting and Assignment) Act, 1971 was constitutionally valid.

Section 10 of the Act lays down that the Government shall after reserving such extent of private forests vested in the Government under sub section (1) of section 3 of the lands comprised in such private forests, as may be necessary for the purposes directed towards the promotion of agriculture or the welfare of the agricultural population or for purposes ancillary thereto, assign on registry or lease to categories of persons mentioned in that section the remaining private forests or the land comprised in private forests on such terms and subject to such conditions and restrictions as may be practised.

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For the implementation of the above provision in the Act, a committee viz., the Vested Forests Committee was constituted. As per rough estimation of the committee the total area of the land vested with the Government was 169,411 ha. out of which 110,634 ha. was fit for permanent reservation and 58,772 ha. for assignment. Survey of the Vested Forests was then taken up and the same nearly completed. The total surveyed extent of the vested forests is nearly 189,292 ha. and the area yet to be surveyed comes to about 2,136 ha. Thus the total extent of private forests vested in Government as per the Kerala Private Forests (Vesting and Assignment) Act, 1971, as per record, was 191,428.60 ha. Out of this an extent of 183,606.60 ha. falls in the erstwhile Malabar region and the balance 7,822 ha. in the erstwhile Travancore-Cochin area.

From the total forest area orginally vested with Government, portions have been restored to the ex-owners either as decided by the custodian, or as ordered by the Forest Tribunals, High Court or Supreme Court, according to the relevant provisions in the Act. Besides this areas have also been handed over to the revenue department for assignment and leased out to various other agencies for non-forestry projects such as Sugandhagiri Cardamom Project, Pookot Dairy Projects Coffee Research Station, Perumthody, Vattachira Tribal Colony, Cashew Plantation. SADU etc. A huge portion of the vested forests is still under dispute regarding ownership awaiting decisions from courts and Forest Tribunals. These details as on February, 1986 is given in the following statement.

		Ha.
1.	Area restored to ex-owners	5,447.90
2.	Area already handed over to Revenue department for assignment	6,953.40
3.	Area leased out for non-forestry purposes.	3,550.20
4.	Area still under dispute and pending decision from the forest tribunals, High Court and Supreme Court	71,300.20
5.	Area without any dispute	104,176.90
	Total	191,428.60

Forest Plantations

The history of raising forest plantations after clearfelling natural forests or by way of afforestation of grasslands and other treeless areas in Kerala, is almost 143 years old today. The first teak plantation raised at Nilambur in 1842 by Chathu Menon under directions from Conolly, the then Collector of Malabar, and the discovery in 1891 of teak stump planting technique in Travancore by T.F. Bourdillon, the then Conservator of Foests, are important milestones in the history of forest management in India.

Teak was probably the only species that was raised on a plantation scale for almost a century beginning from 1842. Subsequently plantations of other economically or industrially important species were also commenced in varying extents. They include species such as *Terminalia tomentosa* (Themba, Kari maruthu) *Lagerstroemia flosreginae* (Mani maruthu), *Artocarpus hirsuta* (Aini, Anjily), *Hopea parviflora* (Kambagom, Kongu), *Bombax ceiba* (Elavu), *Ailanthus triphysa* (Matty), *Acrocarpus fraxinifolius* (Narivenga, Mundani), *Sterculia companulata* (pappeeta), *Mahogany, Eucalyptus, Albizzia,* Silver oak, Jack, Cashew, Casuarina, Pines, Balsa, Bamboo, Wattle etc. These species are normally planted pure as monoculture or in rare instances in mixtures of two species such as Bombax with teak, Anjili with Eucalyptus, Matty with teak etc. As on date Kerala Forest department has a total extent of nearly 154,000 ha. of various plantations within the Forest areas. Besides the departmental plantations the Kerala Forest Development Corporation also has raised plantations of Eucalyptus, Bombax, Cardamom and tea within the forest areas.

Forest Research

Establishment of the Forest Research Institute at Dehra Dun 1906 marked the beginning of organised forestry Research in India. This Research Institute and its regional centres have a complementary relationship with the State Forest Departments and their Research Wings in matters connected with Forest Research.

Forestry research in Kerala was more or less confined to the field of Silvicultural Research with occasional deviations to other related fields such as forest entomology forest pathology forest botany, forest genetics and forest ecology. Silviculture is the art of producing and tending a forest and silvicultural research deals with evolution of methods on a scientific basis.

In Kerala, silvicultural research activities under a Silviculturist started in the erstwhile Malabar area along with the commencement of a Silviculture Division for the old Madras Presidency in 1919. In the Travancore-Cochin area, a separate Silvicultural Research Division was formed in 1952, although some minor research activities were carried out earlier by the staff of the regular Forest Divisions.

Silvicultural research is more or less in its nascent stage except probably the research on teak regeneration, its growth and yield. Through research, we have received valuable information on the silviculture of a few other important species as well; yet teak occupied a very prominent role in the silvicultural research work done in Kerala in the past.

In the early years of silvicultural research in Kerala carried out by the special research division the problems dealt with were mostly related to the study of silviculture of the deciduous. semi-evergreen and evergreen forests of the Malabar region with a view to (a) the regeneration of the most valuable commercial species in the most economical manner and (b) the subsequent treatment of the crop in accordance with the silvicultural requirements of the several species.

Upto 1923-24, research was mostly confined to the following main topics:

(i) Germination and vitality of seeds.

(ii) The shade requirements of young seedlings.

(iii) Comparative methods of obtaining artificial regeneration (eg. sowing, transplanting and stumping).

(iv) The possibility of introducing an underwood in the teak plantations in Nilambur. Valuable results-both positive and negative-were obtained.

For the first seven years upto 1925-26, research was confined mostly to regeneration of species such as *Dalbergia latifolia* (Rosewood), *Hopea Parviflora, Acrocarpus fraxinifolius Terminalia Paniculata, Mesua ferrea, Artocarpus hirsuta, Artocarpus intergrifolia, lagerstroemia lancedata, Lagerstroemia lanceolata, lagerstroemia flosreginae, Terminalia tomentosa* etc. Specific experiments on *Tectona grandis* (Teak) were taken up for the first time in 1926-27 even though the stump planting technique was already discovered and gradually improved in Travancore since 1891. Since then the shift has been

more and more on teak with the result that in the thirties research problems on teak formed almost half of the work of the Madras Provincial Silviculturist.

Subsequently silvicultural research expanded considerably and embodied its multifarious aspects such as regeneration studies with various species including tending operations, study of mixed plantations, underplantings, introduction of exotics, etc., studies on the cause, development and control of pests and diseases, studies on growth and yield of crops, crop improvement by cultural operations, seed selection, etc.

One of the challenging tasks that always confronted forest research was to evolve an effective and economic method to enhance the proportion of valuable species in the natural heterogeneous tropical forests by artificial means. Considerable works on this aspect of silvicultural research had been done in the twenties, thirties and early forties, especially in the evergreen forests of Wynad, Nilambur and Palghat Divisions of the erstwhile Malabar area and to a minor extent in the Shendurney and the Kulathupuzha reserves falling within the Thenmala, Punalur and Trivandrum Divisions of the erstwhile Travancore area. Similar works of a lesser magnitude were carried out in the moist deciduous forests as well. These and similar works done elsewhere in the neighbouring States of Karnataka and Tamil Nadu have thrown much light into the silviculture and management aspects of this complicated problem.

Introduction of valuable species in the natural forests were tried mainly by three methods, namely, (a) gaps, (b) strips and (c) blocks of convenient sizes. The species tried were mostly evergreens such as *Acrocarpus fraxinifolius, Artocarpus hirsuta, Hopea Parviflora, Hopea utilis, Bischofia Javanica, Calophyllum tomentosum, Cedrela toona, Chikrassia tabularis, Dipterocarpus indicus, Eyodia Lunuankenda, Gluta Travancorica, Mesua ferrea, Mangifera indica, Poeciloneuron indicum, Swietenia macrophylla, Vateria indica,* etc. The method of planting was either dibbling of seeds, planting seedlings, stump planting or planting with cuttings.

Our experiments on enrichment of natural forests with valuable species will show that the problems in this direction were many and the progress was only slight. However, the problems which were difficult to cope with four decades ago need not be so problematic in the present day context in all the areas.

Introduction of exotics

Introduction of exotie tropical pines was initiated a few years back. Many species such as *Pinus Kesia (p. insularies)*, *p. patula*, *p. caribaea*, *p. elliottii*, *p. roxburghii*, *p. pseudostrobus*, *p. radiata*, *p. taeda*, *p. echinata*, *p. palustris*, *p. tropicalis*, *p. oooarpa*, have been tried at Devicolam area at elevations ranging from 1200m. to 1800m. In these high altitude areas with fairly well distributed rainfall, *p. patula* has been observed to be the best in terms of survival and growth. From trials so far made, it appears that this species can be safely and successfully planted in such areas. *p. kesia* obtained from Assam also is successful in the area but it is highly susceptible to severe mealy bug attack and therefore, unless sucessful control measures are evolved, it is not advisable to plant this species in any large scale. The other species that are found successful but only next to *p. patula* and *p. kesia* are the following in the order of merit, as observed so far, *p. caribaea*, *p. elliottii*, *p. roxourghii*, *p. pseudostrobus* and *p. radiate*. *p. radiata* also is highly susceptible to mealy hug and therefore should be avoided. *p. taeda* and *p. echinata* are not successful and therefore can be eliminated.

Many of the above species were also tried at lower elevations below 100 metres. The only species that grows very well at lower elevations under forest conditions is *p. caribaea* Var. *hundurenses*. Other *p. caribaea* varieties are to be tried at lower elevations.

Many other exotic species with potential importance have been introduced in Kerala and found successful from trials so far made. The chief among them are:—

Swietenia macrophylla
Crevillia rubusta-Silver oak
Chlorophora excelsa
Pterocarpus dalbergiodes-Andaman Padauk
Streculia companulata
Pericopsis mooniana
Acacia suriculiformis
Bixa orellana
Ailanthus grandis
Lagerstroemia hypoleuca
Eucalptus citriodera

Eucalyptus dunni
Eucalyptus tereticornis
Eucalyptus Camaldulensis
Eucalyptus rudis
Eucalyptus tessellaries
Eucalyptus deglupta
Cephalostachyum pergracille
Dendrocalamus gigantia
Dendrocalamus brandisii
Bambusa Dolymorpha
Calamus caecius, etc. etc.

Growth studies

Growth data on many species have been collected. These data are recorded from sample plots and experimental plots for a few species such as Teak, *Eucalyptus grandis, Eucalyptus hybrid, Bombax, Terminalia tomentosa, Xylia Xylocaroa, Hopea parviflora, Pterocarpus marsupium, housewood, Lagerstroemia lanceolata, Artocarpus hirsuta, Mahogany,* etc. laid out in plantations. For studies on volume increment there are many teak sample plots under various grades of thinnings including the craib and elite methods. For this work the state Silvicultural Research Wing works in close collaboration with the Forest Research Institute. The volume and yield tables of teak published by Forest Research Institute are based on data collected from these sample plots also. Studies on growth data of different species will continue with more intensity.

Forest Genetics

Forest Genetics in India is still in its infancy but a fairly strong foundation has been bulit up. The formation of teak seed origin plots in Nilambur and South Coimbatore perhaps marked the beginning in this direction in South India or in India itself. Observations on these plots have pointed out the genetic variabilities in Teak. Selection of good seedlings and retention of better quality trees were fundamental in the silvicultural practices related to teak plantations. Now large scale attempts and application of improved methods such as formation of seed stands, stand orchards, breeding and progeny, etc, are

made with the object of obtaining a future crop of admitted genetical superiority in terms of survival, growth, yield, disease and pest resistance, etc., and the same is not confined only to teak but to many other important species.

The Kerala Forest Research Institute, Peechi (KFRI)

The Science and Technology policy adopted by the Government of Kerala during the Fifth Five Year Plan envisaged the establishment of autonomous institutions to undertake research in areas which are important for the economic development of the State. The Government felt that application of developments in biological, technical and social sciences could considerably enhance the contribution of Forestry, and this led to the establishment of the Kerala Forest Research Institute. The Institute was registered as a Society in July, 1975 under Travancore-Cochin Literary, Scientific and Charitable Societies Act, 1955. This is, at present, the only autonomous institution engaged in Forestry research in the country. Considering the expertise and capability that have already been built up during the last ten years, upgradation of KFRI as a National Institute and as a centre of excellence is under the active consideration of the Government of India and the State Government with the main objective of focussing attention on ecology and management of tropical moist forests.

LIST OF FAUNA OF KERALA PERTAINING TO THE GROUP PORIFERA, CNIDARIA, ANNELIDA, ECHIURA AND ECHINODERMATA WITH THEIR POPULAR NAMES WHEREVER AVAILABLE*

Phylum—Porifera (Sponges)
Class—Demospongiae
Order—Haplosclerina
Family—Spongillidae (fresh water sponges)

1. *Pectispongilla aurea* Annandale
2. *P. stellifera* Annandale
3. *P. subspinosa* Annandale
4. *Spongilla travancorica* Annandale
5. *Trochospongilla pennsylvanica* (Potts)

Phylum—Chidaria
Class—Hydrozoa
Order—Hydroida (Hydrozoans and Medusae)
Sub order—Thecata
Family—Lafoeidae Hincks

1. *Hebella corrugata* (Thornely)
2. *H. scandens* (Bale)
3. *H. thankasseriensis* Mammen

Family—Heleciidae Hincks

4. *Hydrodendron caciniformis* (Ritchie)
5. *Halecium tenellum* Hincks

Family—Campanulariidae Hincks

6. *Obelia bicuspidata* Clarke
7. *O. geniculata Linnaeus*
8. *Clytia gracilis* (Sars)
9. *C. brevicyathus* Mammen
10. *C. hendersonae* Torrey
11. *C. noliformis* (Mc Cready)
12. *C. Johnstoni* (Alder)

*Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta.

13. *Clytia liguiliformis* Mammen
14. *C. crenata* Mammen
15. *Campanularia erythraea* (Thornely)
16. *Orthopyxis clytioides* (Lamouroux)
17. O. intermedia (Stechow)

Family—Sertulariidae Hincks

18. *Calamphora campanulata* (Warren)
19. *Sertularella tenella* (Alder)
20. *S. parvula* Mammen
21. *Sertularia west-indica* (Stechow)
22. *S. densa* Stechow
23. *S. distans* Lamouroux
24. *S. palkensis* (Thornely)
25. *S. marginata* (Kirchenpauer)
26. *Dynamena thankasseriensis* Mammen
27. *D. quadridentata* (Ell. et. sol.)
28. *Salacia tetracythara* Lamouroux
29. *Nigellastrum mutulatus* (Busk)
30. *N. digitale* (Busk)

Family—Plumulariidae L. Agassiz

Subfamily—Kirchenpaueriinae Stechow

31. *Pyonotheca mirabilis* (Allman) race-*travancorensis* Mammen
32. *Ventromma halecioides (Alder)* var-*minutus* Mammen

Subfamily—Plumulariinae Kuhn

33. *Antennella secundaria* (Gmelin)
34. *Plumularia indica* Mammen
35. *P. polycladia* Mammen
36. Monestaechas quadridens (Mc Crady)

Subfamily—Acladiinae Stechow

37. *Heteroplon silliculata* Mammen
38. *Manoserius pennarius* (Linnaeus)
39. *Gymnangium eximium* (Allman)

40. *G. insigne* (Allman)
41. *Macrorhynchia phoenicea* (Busk)
42. *M. gravelyi* Mammen

Family—Limnoonididae (Medusae)

43. *Limnoonida* sp.

Phylum—Cnidaria

Class—Anthozoa

Subclass—Zoantharia

Order—Madreporaria (Stony Corals)

Family—Oculinidae

1. *Madrepora investigatoris* (Alcock)

Family—Caryophyllidae

2. *Caryophyllia paradoxus* Alcock
3. *Paracyathus stokesi* Milne Ed. and Haime
4. *Solenosmilia jeffrey* Alcock

Order—Alcyonacea (Soft Corals)

Family—Nephthyidae

5. *Dendronephthya malabarensis* Henderson

Order—Pennatulacea (Sea pens)

Family—Pennatulia

6. *Pennatula veneris* Thomson and Henderson

Order—Actiniaria (Sea anemones)

Family—Actiniidae

1. *Paratealia keralensis* Mathew and Kurian
2. *Anthopleura nigrescens* (Verrill)
3. Phymactis sp.
4. Actinia sp.

Phylum—Annelida

Class—Clitellata

Order—Oligochaeta (Earthworms and Aquatic Oligochaetes)

Family—Acanthodrilidae

1. *Plutellus timidus* Cognetti
2. *P. variabilis* Aiyer
3. *Pontodrilus Bermudensis* Beddard

Family—Moniligastridae

4. *Moniligaster deshayesi* Perrier
5. *M. perrieri Michaelsen*
6. *Drawida barwelli* va. *impertusa* Stephenson
7. *D. brunnea* Stephenson
8. *D. circumpapillatus* Aiyer
9. *D. chalakudiana* Stephenson
10. *D. fakir* Cognetti
11. *D. qhatensis* Michaelsen
12. *D. matthaii Michaelsen*
13. *D. Parambikulamana Stephenson*
14. *D. pellucida* var. *pallida* Michaelsen
15. *D. pellucida* f. *typica* Bourne
16. *D. travancorensis* Michaelsen
17. *D. schunkari* Michaelsen

Family—Megascolecidae

18. *Megasolex auricula* Aiyer
19. *M. cochinensis* Stephenson
20. *M. eunephrus* Cognetti
21. *M. filiciseta* Stephenson
22. *M. insignis* Michaelsen
23. *M. kayalianus* Stephenson
24. *M. konkanensis* Fedarle
25. *M. auriculata* Aiyer
26. *M. polytheca* Stephenson
27. *Megascolex poltheca* var. *uniquus* Aiyer
28. *M. pumilio* Stephenson
29. *M. ratus* Cognetti
30. *M. travancorensis* Michaelsen
31. *M. travancorensis* var. *proboscidea* Aiyer
32. *M. trivandranus* Stephenson
33. *M. peermadensis* Aiyer
34. *Lampito mauritii* Kinberg
35. *L. kumileensis* (Aiyer)
36. *Notoscolex ponmudianus* Michaelsen
37. *N. hastata* (Stephenson)
38. *Lennoscolex tenmalai* var. *ghatensis* (Aiyer)

39. *L. koyakalamensis* (Aiyer)
40. *L. minimus* (Aiyer)
41. *L. peermadensis* (Aiyer)
42. *L. Travancorensis* (Aiyer)
43. *Comarodrilus gravelyi* Stephenson
44. *Metaphire houlleti* (Perreer)
45. *Pithemera bicincta* (Perrier)
46. *Pheretima taprobanae* Beddard

Family—Octochaetidae

47. *Ocotochaetoides aitkeni* Fedarle
48. *Octochaetona beatriax* (Beddard)
49. *Dichogaster affinis* (Michaelsen)
50. *D. bolaui* (Michaelsen)
51. *Travoscolides chengasnnures* (Aiyer)
52. *T. cochinensis* (Michaelsen)
53. *T. duodecimalis* (Stephenson)
54. *T. Pilatus* (Stephenson)

Family—Ocnerodrilidae

55. *Gardiodrilus elegans* Beddard
56. *Malaberia biprostata* Aiyer
57. *M. pellucida* Stephenson
58. *Ocnerodrilus occidentalis* Eisen

Family—Eudrilidae

59. *Eudrilus euginiae* Kinberg

Family—Glossoscolecidae

60. *Pontoscolex corethrurus* (Muller)

Family—Microchaetidae

61. *Glyphidrilus annandalei* Michaelsen

Family—Lumbricidae

62. *Eisenia foetida* (Savigny)

Phylum—Annelida

Class—Clitellata

Order—Ologochaeta

Family—Tubificidae (Aquatic Oligochaetes)

1. *Aulodrilus pleuriseta* (Piquet)
2. *A. remex* Stephenson
3. *B. thrioneurum iris* Beddard

Family—Naididae (Aquatic Oligochaetes)

4. *Stephensoniana trivandrana* (Aiyer)
5. *Pristina evalinae* Marcus
6. *P. proboscidea* Beddard
7. *P. longiseta* Ehrenberg
8. *P. equiseta* Bourne
9. *Aulophorus furcatus* (O. F. Muller)
10. *A. michaelseni* Stephenson
11. *A. tonkinensri* (Vejdorsky)
12. *Allonais inaequalis* (Stephenson)
13. *A. pectinata* (Stephenson)
14. *Nais communis* Piquet
15. *Naidium menoni* Aiyer
16. *N. breviseta* Bourne
17. *Salvina appendiculata* (D' Udekem)
18. *Dero zeylanica* Stephenson
10. *D. digitata* (Miller)
20. *D. dorsalis* Ferroniere
21. *D. pectinata* Aiyer
22. *D. palmata* Aiyer
23. *D. nivea* Aiyer

Phylum—Annelida

Class—Clitellata

Order—Hirudinea (Leeches)

Suborder—Arhynchobdellae

Family—Hirudiidae

1. *Hirudinaria granulosa* (Savigny)
2. *Haemadipsa zeylanica cochiniana* Moore
3. *H. zeylanica agilis* Moore

Phylum—Annelida

Class—Polychaeta (Bristle worms)

Order—X

Family—Capitellidae

1. *Paraheteromastus tenuis* Monro

Family—Capitellidae

2. *Prionospio pinnata* Ehlers

Family—Maldanidae

3. *Euclymene insecta* (Ehlers)
4. *E. watsoni* (Gravier)
5. *Diopatra neapolitana* dellechiaje
6. *Ninae* sp.
7. *Onuphis eremita*
8. *Marphysa sanguinea* Montagu

Family—Glyceridae

9. *Glycera longipinnis* Grube
10. *G. rouxii Audouin* and Milne Edwards
11. *G. alba* Rahke

Family—Chaetopteridae

12. *Mesochaetopterus* sp.

Family—Nereidae

13. *Nereis chilkaensis* Southern
14. *Dendroneris aesturina* Southern
15. *Lycastis indica* Southern
16. *Tylonereis bogoyawlensis Kyi* Fauvel
17. *Perinereis cavifrons* Ehlers

Family—Sabellaridae

18. *Sabellaria cementarium* Moore

Family—Lumbrinereidae

19. *Lumbrinereis latreilli* Audouin and Milne Edwards
20. *Lumbrinereis* sp.

Family—Nephtyidae

21. *Nephtys polybranchia* Southern

Family—Pectinariidae

22. *Pectinaria* (Amphictene) *crassa* Grube
23. *Pectinaria* (Lagis) *abranchiata* Fauvel

Family—Terebellidae

24. *Pista indica* Fauvel

Family—Cossuridae

25. *Cossura Coasta* Kitamori
26. *Sternapsis scutata* (Renier)
27. *Amphicteis gunneri* (Sars)

Family—Disomidae

28. *Disoma orissae* Fauvel

Family—Magelonidae

29. *Megelona longicornis* Johnson

Family—Chloraemidae

30. *Brada* sp.

31. *Stylorioides bifidus* Fauvel

Family—Aricidae

32. *Scoloplos marsupialis*

Phylum—Echiura (Spoon worms)

Class—Echiurida

Order—Echiuroinea

Family—Thalassematidae

1. *Listriolobus brevirostris* Chen and Yeh
2. *Ochetostoma septemyotum* Datta Gupta, Menon and Johnson

Phylum—Echinodermata

Class—Crinoidea (Sea Lilies)

Order—Articulata

Family—Antedanidae

1. *Phyllacanthus imperialis* (Lamarck)

Class—Echinoidea (Heart Urchins)

Order—Cidaroida

Family—Cidaridae

1. *Phyllacanthus imperialis* (Lamarck)

Order—Echinothurioida

Family—Echinothuriidae

2. *Sperasoma biseriatum* Doederlein

Order—Clypeastercida

Family—Clypeasteridae

3. *Clypeaster himilis* (Leske)
4. *C. rarispinus* de meijere

Family—Fibularidae

5. *Echinocyamus sollers* Koehler

Order—Spatangoida

Family—Asterostomatidae

6. *Elipneustes rubens* (Koehler)

Family—Hemiasteridae

7. *Hemiaster vanus* Koehler

Family—Brissidae

8. *Brissopsis bengulensis* Koehler
9. *B. luzonica* (Gray)

Class—Stelleroidea

Subclass—Asteroidea (Star fishes)

Order—Paxillosida

Family—Astropectinidae

10. *Astropecten inutilis* Koehler

Order—Valvatida

Family—Asterinidae

11. *Palmipes ludovici* Koehler

Subclass—Ophiroidea (Brittle stars)

Order—Valvatida

Family—Asterinidae

12. *Amphioplus (Lymanella) depressus* (Ljungman)
13. *Amphiura lorioli* (Koehler)

Family—Ophiotrichidae

14. *Ophiactis lorioli* Koehler

Family—Ophiactidae

15. *Ophiothrix savignyi* (Muller and Troschel)
16. *O. vitrea* Doederlein

Family—Ophionereidae

17. *Ophiochiton ambulator* Koehler

Family—Ophiuridae

18. Amphiophiura paupera (Koehler)
19. *Ophiernus adspersus* Lyman
20. *Ophiomusium elegans* Koehler
21. *O. familiare* Koehler

Class—Holothuroidea (Sea sucumbers)

Order—Dendrochirotida

Family—Cucummarlidae

22. *Trachythyone typica* (Theel)

LIST OF ANIMALS (NEMATODA)

1. *Nematoda*

Order—Tylenchida

1. *Hoplolaimus indicus** Shar, 1963
2. *Helicotylenchus crebensis** Roman, 1965
3. *Hirschmanniella oryzae** (Breda de Haan, 1902) Lue and Goodey, 1963
4. *Radopholus similis** (Cobb, 1893) Thorne, 1949
5. *Tylenchulus semipenetrans** Cobb, 1913
6. *Aphelenchoides oryzae** Yokoo, 1948
7. *Meloidogyne incognita** (Kofoid and White, 1919) Chitwood, 1949
8. *Meloidogyne javanica** (Treub, 1885) Chitwood, 1949

Order—Dorylaimida

9. Tylencholaimellus projectus Siddiqi, 1964

Order—Mononchida

10. *Mylonchulus minor* (Cobb, 1893) Andrassy, 1958
11. *Mylonchulus contractus* Jairajpuri, 1970
12. *Mylonchulus hawaiensis* (Cassidy, 1931) Andrassy, 1958
13. *Mylonchulus Brachyuris* (Butschli, 1873) Altherr, 1953
14. *Iotonchus bagrii* Jairajpuri, 1969
15. *Iotonchus indicus* Jairajpuri, 1969
16. *Iotonchus risoceiae* (Carvalho, 1955) Andrassy, 1958.

*Species of the order Tylenchida are serious pests of agricultural crops in Kerala.

FAUNA OF KERALA FOR CERTAIN INSECT ORDERS VIZ., *EPHEMEROPTERS* PSCOPTERA AND ODONATA

Ephemeroptera fauna of Kerala

Class—Insecta
Order—Ephemeroptera
Family—Ephemeridae
Genus—*Ephemera* Linnaeus

Ephemera supposita Eaton

Family—Prosopistomatidae
Genus—Prosopistoma Latreiile

Prosopistoma indicum Peters

Family—Leptophlebidae
Genus—*Indialis* Peters and Edmonds

Indialis Badia Peters and Edmonds
Indialis rosi Peters

Genus—*Petersula* Sivramkrishnan

Petersula courtallensis Soldan

Genus—*Notophlebia* Peters & Edmonds

Notophlebia jobi Sivramkrishnan & Peters

Psocoptera fauna of Kerala

Order—Psocoptera
Family—Pachytroctidae
Genus—*Pachytroctes* Enderlien

Pachytroctes georgi (Menon)
Pachytroctes cochinensis (Menon)
Tapinella formosana Enderlien

Famil—Leposcelidae
Genus—*Embidopsocus* Hagen

Embidopsocus trichurenis Menon

Odonata fauna of Kerala

Class—Insecta
Order—Odonata
Suborder—Zygoptera

Family—Platystictidae

Genus—*Protosticta* Selys

Protosticta gravelyi Laidlaw
Protosticta sanguinostigma Fraser
Protosticta hearseyi Fraser
Protosticta davenporti Fraser
Protosticta antelopoides Fraser

Genus—*Platysticta* Selys

Platysticta decanensis Laidlaw

Family—Protoneuridae

Genus—*Elattoneura* Cowley

Elattoneura tetrica (Laidlaw)
Elattoneura souteri (Fraser)

Genus—*Prodasineura* Cowley

Prodasineura verticalis annandalei (Fraser)

Genus—*Phylloneura* Fraser

Phylloneura westermanni (Selys)

Genus—*Esme* Fraser

Esme mudiensis Fraser

Genus—*Caconeura* Kirby

Caconeura gomphoides (Rambur)
Caconeura ramburi (Fraser)
Caconeura risi (Fraser)

Genus—*Melanoneura* Fraser

Melanoneura bilineata Fraser

Family—Coenagrionidae

Genus—*Pseudagrion* Selys

Pseudagrion decorum (Rambur)
Pseudagrion microcephalum (Rambur)
Pseudagrion rubriceps rubriceps Selys
Pseudagrion indicum Fraser
Pseudagrion malabaricum Fraser

Genus—Ceriagrion Selys

Ceriagrion coromadelianum (Fabr.)
Ceriagrion rubiae Laidlaw

Ceriagrion olivaceum Laidlaw

Ceriagrion cerinorubellum (Braner)

Genus—*Aciagrion* Selys

Aciagrion hisopa Selys

Aciagrion occidentale Laidlaw

Genus—*Ischnura* Charpentier

Ischnura aurora aurora (Braner)

Ischnura senegalensis (Rambur)

Genus—*Agriocnemis* Selys

Agriocnemis pygmaea pygmaea (Rambur)

Agriocnemis pieris Laidlaw

Agriocnemis splendidissima Laidlaw

Genus—*Mortonagrion*

Mortonagrion varrili Fraser

Genus—*Coenagrion*

Coenagrion dyeri (Fraser)

Genus—*Enallagma*

Enallagma parvum Selys

Family—Platycnemidiae

Genus—*Copera* Kirby

Copera marginipes (Rambur)

Copera vittata Selys

Family—Lestidae

Genus—*Lestes* Leach

Lestes elata Selys

Lestes malabarica Fraser

Lestes davenporti (Fraser)

Genus—*Paralestes* Schmidt

Paralestes praemorsa praemorsa (Selys)

Family—Calopterygidae

Genus—*Neurobasis* Selys

Neurobasis chinensis chinensis (Linnaeus)
Genus—*Vestalis* Selys
Vestalis gracilis gracilis (Rambur)
Vestalis apicalis apicalis Selys
Family—Euphaeidae
Genus—*Indophaea* Fraser
Indophaea dispar (Rambur)
Indophaea fraseri (Laidlaw)
Indophaea cardinalis (Fraser)
Family—Chlorocyphidae
Genus—*Libellago* Selys
Libellago lineata indica Fraser
Genus—*Rhinocypha* Rambur
Rhinocypha bisignata Selys
Genus—*Rhinocypha* Rambur
Rhinocypha bisignata Selys
Genus—*Calocypha* Fraser
Calocypha laidlawi (Fraser)
Sub order—Anisoptera
Family—Gomphiade
Genus—*Gomphus* Leach
Gomphus nilgiricus Laidlaw
Genus—*Burmagomphus* Williamson
Burmagomphus pyramidalis Laidlaw
Genus—Davidioides Fraser
Davidioides martini Fraser
Genus—*Paragomphus* Cowley
Paragomphus lineatus (Selys)
Genus—*Onychogomphus* Fraser
Onychogomphus striatus Fraser
Genus—*Lamelligomphus* Fraser
Lamelligomphus nilgiriensis (Fraser)
Lamelligomphus acinaces (Laidlaw)
Lamelligomphus malabarensis Fraser
Genus—*Megalogomphus* Campion

Megalogomphus hannyngtoni (Fraser)
Megalogomphus superbus Fraser
Genus—*Merogomphus* Martin
Merogomphus longistigma (Fraser)
Genus—Heliogomphus Laidlaw
Heligomphus promelas (Selys)
Genus—*Macrogomphus* Selys
Macrogomphus wynadicus—Fraser
Genus—*Microgomphus* Selys
Microgomphus souteri Fraser
Genus—*Ictinogomphus* Cowley
Ictinogomphus rapax (Rambur)
Genus—*Gomphidia* Selys
Gomphidia kodaguensis Fraser
Family—Cordulegasteridae
Genus—*Chlorogomphus* Selys
Chlorogomphus xanthoptera (Fraser)
Chlorogomphus campioni (Fraser)
Family—Aeshnidae
Genus—*Hemianax* Selys
Hemianax ephippiger (Burmeister)
Genus—*Anax* Leach
Anax Mimaculifrons Rambur
Anax guttatus (Burmeister)
Genus—*Anaciaeschna* Selys
Anaciaeschna jaspedia (Burmeister)
Anaciaeschna martini (Selys)
Genus—*Gynacantha* Rambur
Gynacantha dravida Lieftinck
Gynacantha millardi Fraser
Family—Corduliidae
Genus—*Hemicordulia* Selys
Hemicordulia asiatica Selys
Genus—*Epopthalmia* Burmeister
Epopthalmia vittata cyanocephala Hagen
Epopthalmia frontalis frontalis Selys

Family—Macromiidae

Genus—*Macromia* Rambur

Macromia cingulata Rambur

Macromia indica Fraser

Macromia anaimalaiensis Fraser

Macromia irata Fraser

Macromia ellisoni Fraser

Macromia flavocolorata Fraser

Genus—*Macromidia* Martin

Macromidia donaldi (Fraser)

Genus—*Idionyx Hagen*—Selys

Idionyx corona Fraser

Idionyx burliyarensis Fraser

Idionyx saffronata (Fraser)

Idionyx nadganiensis Fraser

Idionyx travancorensis Fraser

Idionyx minima Fraser

Family—Macrodiplactidae

Genus—*Urothemis* Braner

Urothemis signata signata (Rambur)

Genus—*Aethriamanta* Kirby

Acthriamanta brevipennis brevipennis (Rambur)

Family—Libelludiae

Genus—*Tetrathemis* Selys

Tetrathemis platyptera Selys

Genus—*Hylaeothemis* Ris

Hylaeothemis fruhstorferi (Karsch)

Genus—*Amphithemis* Selys

Amphithemis Mariae Laidlaw

Genus—*Lathrecista* Kirby

Lathrecista asiatica asiatica (Fabricues)

Genus—*Cratilla* Kirby

Cratilla lineata (Braner)

Genus—*Potamarcha* Karsch

Potamarcha obscura (Rambur)

Genus—*Orthetrum* Newman

Orthetrum taeniolatum (Schneider)
Orthetrum luzonicum (Brauer)
Orthetrum sabina sabnia (Drury)
Orthetrum glaucum (Brauer)
Ortheturm pruinosum neglectum (Rambur)
Orthetrum triangulare triangulare (Selys)

Genus—*Palpopleura* Rakbur

Palpopleura sexmaculata sexmaculata (Fabr.)

Genus—*Brachydiplax* Brauer

Brachydiplax sobraria (Rambur)

Genus—*Acisoma* Rambur

Acisoma panorpoides panorpoides Rambur

Genus—*Diplacodes* Kirby

Diplacodes nebulosa (Fabr.)
Diplacodes trivialis (Rambur)

Genus—*Indothemis* Ris

Indothemis carnatica (Fabr.)

Genus—*Crocothemis* Brauer

Crocothemis servilia servilia (Drury)

Genus—*Bradinopyga* Kirby

Bradinopyga geminata (Rambur)

Genus—*Brachythemis* Brauer

Brachythemis contaminata (Fabr.)

Genus *Neurothemis* Brauer

Neurothemis tullia tullia (Brury)
Neurothemis intermedia intermedia (Rambur)

Genus—*Rhodothemis* Ris

Rhodothemis rufa (Rambur)

Genus—*Sympetrum* Newman

Sympetrum fonscolombei (Selys)

Genus—*Trithemis* Brauer

Trithemis aurora (Burmeister)
Trithemis pallidinervis (Kirby)
Trithemis festiva (Rambur)

Genus—*Zygonyx* Selys

Zygonyx iris metallica Fraser

Genus—*Onychothemis* Brauer

Onychothemis tastacea ceylanica (Ris)

Genus—*Tholymis* Hagen

Tholymis tillarga (Fabr.)

Genus—*Pantala* Hagen

Pantala flavescens (Fabr.)

Genus—*Rhyothemis* Hagen

Rhyothemis variegata variegeta (Linnaeus)

Rhyothemis traingularis Kirby

Genus—*Tramea* Hagen

Tramea basilaris burmeisteri Kirby

Tramea limbata (Desjardins)

LIST OF TERMITES (ISOPTERA)

1.	*Postelectrotermes bhimi* Roonwal & Maiti	Southern India, Vandiperiyar Village (Idukki District, Kerala)
2.	*Postelectrotermes nayari* Roonwal & verma	Southern India: Chakai, Trivandrum, (Kerala)
3.	*Neotermes keralai* Roonwal & Verma	Southern India: Chakai, Trivandrum, Kerala State.
4.	*Neotermes nilamburensis* Thakur	Southern India: Nilambur, Kerala.
5.	*Cryptotermes domesticus*	Southern India: Cannanore (Kerala)
6.	*Cryptotermes roonwali Chhotani*	Southern India: Baliapatam (North Malabar, Kerala State)

7.	*Heterotermes malabaricus* Snyder	Southern India: Kerala: Pappaniamcode and Trivandrum Environs
8.	*Coptotermes ceylonicus* Holmgren	Southern India: Kerala: Trivandrum & Environs
9.	*Coptotermes heimi* (Wasm.)	Southern India: Kerala Panchakanam Res. For.
10.	*Speculitermes emersoni* sp. n.	Southern India: Thekkadi; Kerala (Type locality)
11.	*Microcerotermes cameroni* Snyder	Southern India: Tamil Nadu, North Vellore, Kerala
12.	Microcerotermes fletcheri Holmgren & Holmgren	Southern India: Kerala: Nilambur, Panchakanam Res. For. Periyar Lake area
13.	*Homallotermes pilosus* (Mathur & Thapa)	Southern India: Tamil Nadu; Top slip; Kerala: Kuttikanam near Peermade and Panchakanam Res. For.
14.	Dicuspiditermes fletcheri (Holmg & Holmg)	Southern India: Kerala: Puthupadi Forest, Malabar.
15.	*Procopritermes fontanellus* (Mathur & Thapa)	Southern India: Kerala: Kuttikanam near Peermade.
16.	*Labiocapritermes distortus* (Silvestri)	Southern India: Kerala: Kavalai and Kuttikanam near Peermade.
17.	*Odontotermes anamallensis* Holmg & Holmg	Southern India: Kerala: Nilambur

18.	*Odontotermes ceylonicus* (Wasm)	Southern India: Kerala: Nilambur
19.	Odontotermes horni (Wasm)	Southern India: Kerala: Nilambur
20.	Odontotermes obesus (Rambur)	Southern India: Kerala: Konnoth Forest Range, Nilambur, Panchakanam Reserve Forests & Quilandy.
21.	*Odontotermes redemanni* (Wasm)	Southern India: Kerala: Kuttikanam near Peermade, Nilambur, Thekkadi.
22.	*Odontotermes roonwali* Bose	Southern India: Kerala: Nilambur
23.	*Odontotermes vaishno* Bose	Southern India: Kerala: Konnoth Forest Range.
24.	*Microtermes globicola* Wasmann	Southern India: Kerala Thora (Cochin).
25.	*Nasutitermes loeckeri* Prasad & Sen Sarma	Southern India: Kuttikanam, Near Peermade, Neriamangalam, Panchakanam Reserve Forest, Thekkadi.
26.	*Nasutitermes brunneus* Snyder	Southern India: Kerala, Konnoth Forest Range, Nilambur.
27.	*Nasutitermes indicola* (Holmg & Holmg)	Southern India: Kerala: Thekkadi.
28.	*Ampoulitermes wynaadensis* Mathur & Thapa	Southern India: Kerala State
29.	*Emersonitermes thekadensis* Mathur & Sensarma	Southern India: Kerala: Thekkadi
30.	*Ceylonitermes indicola* Thakur	Southern India: Kerala: Nilambur
31.	*Trinerlitermes biformis* (Wasm)	Southern India: Kerala: Nilambur, Tellichery (Malabar)

LIST OF HEMIPTERAN

Insecta—Hemiptera

Family—*Lygaeidae*

1. *Oncopettus nigriceps* Dall
2. *Spilostethus hospes* (Fabr.)
3. *Graptostethus argentatus* Fabr.
4. *G. servus* Fabr.
5. *G. guadrisignatus* Dist.
6. *Oncopeltus rubricatus* Stal
7. *Pyrohabaphus leucurus* Fabr.
8. *Nygins melanicus* Dist.
9. *Macropes dilutus* Dist.
10. *Macropes consobrinus* Dist.
11. *M. consimiles* Dist.
12. *M. abbreisatus* Dist.
13. *Geocoris tricolor* Fabr.
14. *G. flaviceps* Bevem
15. *G. dubrenili* Montd.
16. *Geocoroides polytretus* Dist.
17. *Pamera geniculata* Mostsch.
18. *Eucosmeths nigreonistens* Dist.
19. *Applonius picturatus* Dist.
20. *Lecutius atratus* Dist.
21. *Fabulinus gemnatus* Dist.
22. *Cligeaes sexnotatus* Berger
23. *Aphsnus tateralis* Dist.
24. *A. discoguttatus* Dist.

Family—*Pyrrhocoridae*

Antilochus lineatipes Stal
Melamphans fulvomarginatus Dohrn
Odontopus sanguinolens Amy & Serv.
Dindymus cenaeus Dist.
Pyrrhocoris aptesius Linn.

Scantius volucris Garstaeck
Rhodoclia convictionis Dist.

Family—*Cicadellidae*

Tettigella insignior Dist.
Tettigella kitagiriensia Dist.
T. *gemine* Dist.
T. spectra Dist.
T. sylvonella Dist.
T. kharavela Dist.
Kolla unimaculata Dist.
Kolla pronctalis Dist.
Kolla gonesa Dist.
Kolla diaphana Dist.
Kolla kodaiana Dist.
Kolla atronotata Dist.
Faenius butleri Dist.
Penthimia nilgiriense Dist.
Penthimia montana Dist.
Penthimia variabilis Dist.
Penthimia funebris Dist.
Penthimia thoracica Dist.
Penthimia flavocapitata Dist.
Penthimia maculosa Dist.
Penthimia fraterna Dist.
Penthimia quadrinitata Dist.
Neodarttus scutellatus Dist.
Traiguma verticatis Dist.
Parabolocratus rusticus
Parabolocratus lutescens Dist.
Bumizana elongata Dist.
Gurawa vaxillum Dist.
Nirvana suturatis Melish
Nirvana pallida Melish
Kana signata Dist.
Kana modesta Dist.

Carvaka picturata Dist.
Carvaka thoracica Dist.
Carvaka modesta Dist.
Carvaka ochophara Dist.
Kutana brunnescens Dist.
Gomagnatus funosus Dist.
Thagria capitata Dist.
Jassus indicus Walk.
Jassus pauperculus Spangh
Jassus Coonocrensis Dist.
Phrysomorphus fusconervosus
Phrynomorphus ootacamundus Dist.
Phlepsius divaricatus Melish
Xestocephalus relatus Dist.
Xestocephalus transversus Dist.
Ootacamundus typicus Dist.
Diviliacus primus Dist.
Eutettix phycitis Dist.
Eutettix lugubris Dist.
Mahalana lugubris Dist.
Scaphoides redundans Dist.
Scaphoides nutans Dist.
Scaphoides brachycephalus Dist.
Scaphoides palliforns Dist.
Hussa insignis Dist.
Campbellinella illustrata Dist.
Nandidrug viridicans Dist.
Pllectus notatus Dist.
Crispina nigristigma Dist.
Alonura atrota Dist.
Galerius indicatrix Dist.
Maximianus notatus Dist.
Maximianus Cephalicus Dist.
Deltocephalus campbelli Dist.
Deltocephalus butleri Dist.
Deltocephalus capitatus Dist.

Orosius olbicinctus Dist.
Leofa pedestris Dist.
Gunhilda noctua Dist.
Empoasca rubronotata Dist.
Empoasca fuscofasciata Dist.
Empoasca atropurpuorea Dist.
Empoasca nigroscutellata Dist.
Empoasca radha Dist.
Paivanana durga Dist.
Eupteryx sanguinolenta Dist.
Camulus bellulus Dist.
Typhlocyba ornatula Dist.
Typhlocyba atrosignata Dist.
Typhlocyba gullulata Dist.
Typhlocyba cooruliscens Dist.
Typhlocyba sanguinalis Dist.
Typhlocyba cardinalis Dist.
Typhlocyba spectra Dist.
Typhlocyba opulenta Dist.
Typhlocyba incerta Dist.
Empoanara militaris Dist.
Tituria planata Fabs.
Tituria actuangulata Dist.
Petalocephala uniformis Dist.
Petalocephala umbrosa Dist.
Petalocephala nigrilinea Walk.
Petalocephala brachycephala Dist.
Ledra dilatata Walk.
Ledropsis Obligens Walk.
Tetligella ferruginea Fabr.
Tetligella bellona Dist.
Tetligella quadrilineata Sign.
T. indiga Dist.
T. sandaracata Dist.
Tetligella habilis Dist.
Penthimia subniger Dist.

Haranga decurtata Dist.
Balala fulviventris Walk.
Traiguma nasuta Dist.
Krisna strigicollis Spin.
Drabescus stramineus Dist.
Jassus nocturnus Dist.
P. signata Dist.
P. bombayensis Dist.
P. gramlosa Dist.
P. bainbriggei Dist.
Ledropsis lutescens Dist.
Bythoscopus magnus Dist.
Nehela violacea Dist.
Moonia capitata Dist.
M. bruanea Dist.
M. variabilis Dist.
M. diversa Dist.
M. albivitta Dist.
Pediopsis orientalis Dist.
P. lovedalensis Dist.
D. garuda Dist.

Family—Membracidae

1. *Convector cavendus* Dist.
2. *Leptoceutrus senlellatus* Dist.
3. *L. bajulans* Dist.
4. *Imporcitor typicans* Dist.
5. *Otinotus campbelli* Dist.
6. *O. badius* Dist.
7. *O. alhomaculatus*
8. *O. mimicus* Dist.
9. *Tricentrus pronus* Dist.
10. *Gargara caelata* Dist.
11. *Insitor exemplifoalus* Dist.
12. *Parayasa tysica* Dist,
13. *P. maculosa* Dist.

14. *P. elegantula* Dist.
15. *P. affixa* Dist.
16. *P. atricapilla* Dist.
17. *P. dissimilis* Dist.
18. *P. modesta* Dist.
19. *P. rustica* Dist.
20. *Centrotypus seemus* Buck
21. *C. orius* Dist.
22. *O. ammon* Buck
23. *Tricentrus subangulatus* Dist.

Family--Reduviidae

1. *Canthesancus helluo* Stal
2. *Thodelums falleni* Dist.
3. *Reduvius esan* Dist.
4. *Acanthaspis apicata* Dist.
5. *Physorhynchus pedestris* Dist.
6. *P. nigroviolaceus* Rent.
7. *P. rubromaculatus* Dist.
8. *Eriximachus globosus* Dist.
9. *Rhaphidoxoma atkinsoni* Bergr.
10. *Narpactor nilgiriensis* Dist.
11. *Harpactor pygmaeus* Dist.
12. *Sphedanolestes stigmatillus* Dist.
13. *S. Signatus* Dist.
14. *S. variabilis* Dist.
15. *Sycanus affinis* Rent.
16. *Alamena strainipee* Dist.
17. *Panthons bimaculatus* *Dist.*
18. *Irantha consobrina* Dist.
19. *Hanruohahnia gallus* Dist.
20. *Ophisthoplstys cornutus* Dist.
21. *Oncouphalus aterrimus* Dist.
22. *Sphedanolestes fraterculus* Bergr.
23. *Sycanus albofasciatus* Bergr.
24. *Macracanthopis* hampsoni Dist.

Family—*Pentatomidae*

1. *Dalpada varsicolar* Hebr—schaeff
2. *D. pilicornis* Stal.
3. *Erthesina fullo* Thumb.
4. *Halys deutatus* Fabr.
5. *H. nilgiriensis* Dist.
6. *Sciocoris indicus* Dall.
7. *Cappaea taprobanensis* Dall.
8. *Niphe subtesruginea* Crester.
9. *Tolumnia latipes* Dall.
10. *T. immaculata* Dist.
11. *Hermolaus typicus* Dist.
12. *Plantia fimbriata* Fabr.
13. *Placosternum taurus* Fabr.
14. *Rhynchocoris plagiatus* Walk.
15. *Vitellus drientulis* Dist.
16. *Nezara viridula* (Linn.)
17. *N. graminea* Fabr.
18. *Tessaratoma papillosa* Dravcy.
19. *Sastragala heterospila* Walk.
20. *Elasmostethus nilgirense* Dist.
21. *E. lewsi* Dist.
22. *Captosoma signaticolle* Montd.
23. *C. pulohellum* Montd.
24. *Dalpada tauriformis* Dist.
25. *Phricodus hystrix* Germ.
26. *Sciocoris funebrus* Dist.
27. *Scpontia nigrofusca* Dist.
28. *Hamolans mobustus* Dist.
29. *Gynenica affinis*
30. *Agonoscelis campbelli* Dist.
31. *Mendia pundalnoyae*
32. *Sastragala modesta* Dist.

Family—Capsidae

1. *Zeratus repandus* Dist.
2. *Nicostratus princeps* Dist.
3. *Armacharus nilgiriensis* Dist.
4. *Miris atkinsoni* Dist.

5. *megacochum hampsoni* Dist.
6. *Zanessa sanguinolenta* Dist.
7. *Lygus sordidus* Dist.
8. *Lygus albescens* Dist.
9. *Megacoelum antennatum* Kirby.

Family—Coreidae

1. *Homoeocerus indiens* Dist.
2. *Corizus mubriumdus* sign.
3. *Corizus macropictus* Dist.
4. *Serinetha abdominalis* Fabr.
5. *Homococerus macula* Dall.
6. *H. nigridorsum* Horv.
7. *H. montanus* Dist.
8. *Notabitus meleagris* Fabr.
9. *Coresumms nepalensis* Wester.
10. *Plinachtus basatis* Wester.
11. *Duliochiks inflatus* Kirby

Family—Scutelleridae

1. *Scutellera nobilis* Fabr.
2. *Chrysocoris stockerus* Linn.
3. *C. marginellus* Wester.
4. *C. simplex* Atk.
5. *Hotea nigrorufa* Walk

Family—Plataspidae

1. *Bozius exsiecus* Dist.
2. *Brachyplatys subaeneus* Wester.
3. *Captosoma nilgirense* Dist.
4. *Captosoma feanum* Montd.

Family—Cydnidae

1. *Cephalocleus meloloathoides* Schiddte
2. *Stiboreopus tabulatus* Schiodte
3. *Cyduns nigruus* Fabr.

Family—Cicadidae

1. *Platypleura polita* Walk
2. *P. coelebes* Stal
3. *P. basiviridis* Walk
4. *P. capitata* Oliv.

5. *P. hampsoni* Dist.
6. *P. Octogultata* Fabr.
7. *Cryptotympoma Corvus* Walk
8. *C. meeta* Walk
9. *C. exalbida* Dist.
10. *Purana tigrina* Walk.
11. *P. morrisi* Dist.
12. *Dundubia cmanatura* Dist.
13. *Platyloma amicta* Dist.
14. *P. larus* Walk.
15. *Pomponia fasca* Oliv.
16. *Calcagnirus picturatus* Dist.
17. *C. nilgiriensis* Dist.
18. *Khimbya sits* Dist.
19. *K. diminuta* Walk.
20. *Gaena alkinsoni* Dist.
21. *Lemuriana apicalis* Germ.
22. *Rihana seminiger* Dist.

Family—Nepidae

Ranatra elongata Fabr.

Family—Hydrometridae

1. *Rhajonctia nigricans* Bowen
2. *Germs najor* Dist.
3. *Jucandus custodiendus* Dist.
4. *Oayohotrechus kumari* Dist.
5. *Janias elegantulus* Dist.
6. *Germis fluarorum* Fabr.
7. *Germis nitida Mayr.*
8. *Cylindrostethus productus* Spih.
9. *Ptilomera laticandata* Hardw.
10. *Metrocoris Stali* Dohm

Family—Saldidae

1. *Leptopus travancorensis* Dist.

Family—Notonectidae

1. *Anisops varins* Fieb.
2. *Enithascs indica* Fabr.
3. *E. triangularis* Guer.

Family—Corixidae

1. *Micronecia minthe* Dist.
2. *M. Issa* Dist.
3. *M. punctata* Fieb.
4. *M. striata* Feib.

Family—Tingidae

1. *Monan thia nilgiriensis* Dist.

Family—Phymatidae

1. *Carainocoris hampioni* Dist.

Family—Berytidae

1. *Megalomerium perteacrum* Bredd
2. *Hubertiella eardmoni*

Family—Belostomatidae

1. *Belostoma indicum* Leptserv.

Family—Cercopidae

1. *Ptyelus praetractus* Dist.
2. *Cloria signata* Dist.
3. *Aphrophora cognata* Dist.
4. *Tembrana montana* Dist.
5. *T. ornata* Dist.
6. *Sovnama imprimis* Dist.
7. *Philagra dissimilis* Dist.
8. *Foscarla nilgiriensis* Dist.
9. *Phymatostetta deschampsi* Leth.
10. *Cosmoscrata naiteara* Dist.
11. *C. thoracica* Dist.
12. *C. naiteara* Dist.
13. *Machacrota pandota* Dist.
14. *Condicor collatatus* Dist.
15. *Lepyronia pardalia* Dist.
16. *Abdag numcupatus* Dist.
17. *Tembrana costatis* Dist.
18. *Hindola lucida* Dist.
19. *Eoscrata fuscata* Dist.
20. *E. ferruginea* Dist.
21. *Nigilantius fascialis* Dist.
22. *Cosmocrata imraji* Dist.

Family—Nancorcoridae

1. *Helcocoris bergrothi* Monto
2. *H. indicus* Montd.
3. *Nancoris sordidus* Dist.

Family—Fulgoridae

1. *Messena albifasciata* Dist.
2. *Dictyophora coimbatorensis* Dist.
3. *Putala brachycephala* Dist.
4. *Caneirora indica* Dist.
5. *Mundopa campbelli* Dist.
6. *M. regiana* Dist.
7. *M. sita* Dist.
8. *Stacotoides typicus* Dist.
9. *Robigalia butleri* Dist.
10. *Kinnara maculata* Dist.
11. *Phenice ferruginata* Dist.
12. *Thabenoides albinotatus* Dist.
13. *Kermesia nigropunctata* Dist.
14. *Kodaiana campbelli* Dist.
15. *Tetrica nigromaculata* Dist.
16. *Peratetrica opalina* Dist.
17. *Corencanius fascialis* Dist.
18. *Opergithus erebus* Dist.
19. *Apachnas nobilis* Dist.
20. *Satapa tuberculosa* Dist.
21. *Ketumala fuscomarjinata* Dist.
22. *Anaya nigropunctata* Dist.
23. *Onkelos annulatus* Dist.
24. *Alilas fasciatus* Dist.
25. *Libwenia atromaculata* Dist.
26. *Syrops dokrni* Stal
27. *Fulgora delesserti* Guir
28. *Kalidasa nigromaculata* Gray
29. *Gebenna sylvia* Stal
30. *Emeybrachys lepelletieri* Guir
31. *E. venusta* Stal
32. *E. manifesta* Dist.

33. *E. Tomentosa* Fabr.
34. *E. dilatata* Walk.
35. *Messena radiata* Dist.
36. *Messena sinuata* Atkins
37. *Dictyophora hampsone* Dist.
38. *Dictyophora nilgiriencis* Dist.
39. *D. pallida* Don.
40. *Putala maculata* Dist.
41. *Centromeria cephalica* Dist.
42. *Dictyopharina viridissima* Melich
43. *Oliarus punctipennis* Dist.
44. *Givalka hampsoni* Dist.
45. *Devagamar venosa* Dist.
46. *Narayana ambrosa* Dist.
47. *Samantiga abdominalis* Dist.
48. *Hemisphaerius nilgiriensis* Dist.
49. *H. elongatus* Dist.
50. *Ricania fenestrata* Fabr.
51. *R. speculum* Walk.
52. *R. bicolorata* Dist.
53. *Anggira tygica* Dist.
54. *Cerynia marea* White
55. *Phyllyphanta sinensis* Walk
56. *Pulaha contracta* Dist.
57. *Scarphantina modesta* Dist.
58. *Melioharia quadrata* Kirby
59. *Tejassa umbrata* Dist.
60. *Gomeda abdominalis* Kirby.

SPECIES RECORDED/COLLECTED FROM KERALA STATE

Class—Insecta
Order—Orthoptera
Family—Tetrigidae

Tripetalocera ferruginea (Bolivar)
Tettilobus prashadi Gunther
Hanoockella portentosa (Kirby)
Epitettix tamilus Gunther
Euscelimena nodosa (Walker)

Eucriotettix spinilobus (Hancock)
E. flavopictus (Bolivar)
E. tricarinatus (Bolivar)
Loxilobus hancocki Kirby
Bolotettix anomalus Hancock
Systolederus greeni Bolivar
Bolivaritettix nilgiricus (Hebard)
Xistrella stylata (Hancock)
Spadotettix provertex Hancock
S. gravely Hancock
Euparatettix personatus Bolivar
Paratettix cingalensis (Walker)
Hedotettix attenuatus Hancock
Coptotettix artolobus Hancock
C. testaceus Bolivar

Family—Pyrgomorphidae

Atractomorpha crenulata (Fabr.)
Chrotogonus (Cho) *oxypterus* (Blanch.)
Neorthacris acuticeps nilgiriensis (Uvarov)
N. malabarensis Kevan

Family—Eumastacidae

Phyllochoreia ramarkrishnai Bolivar
Bennia burri Bolivar

Family—Gryllacrididae

Gryllacris spuria Brun.
G. gladiator Fabr.
Gryllacropsis magniceps (Walk.)
Hypocophus biforaminatus Grif.
H. indicus Bolivar
Rhaphidophora deusta Brunn.

Family—Acrididae

Acrida exaltata (Walker)
Acrotylus humbertianus Sauss.
Morphacris Citrina Kirby
Oedaleus abruptus (Thunb.)
Gastrimargus africanus africanus (Saussure)
Trilophidia annulata (Thunb.)
Aiolobus thalassinus tamulus (Fabr.)

Family—Hemiacrididae

Spathosternum prasiniferum pr. (Walker)

Family—Catantopidae

Catantops pinguis innotabilis pr. (Walker)

Family—Catantopidae

Catantops pinguis innotabilis (Walker)

Catantops henryi Bolivar

Xenocatantops humilis humilis (Serville)

Chitaura indica Uvarov

Cyrtacanthacris tatarica (Linn.)

Heteracris capensis Thunb.

Oxya nitidula (Walker)

Oxya hyla hyla Serville

Family—Gryllotalpidae

Gryllotalpa africana Beauv.

Family—Gryllidae

Gymnogryllus humeralis (Walker)

G. minor Chopard

Sphecogryllus armatus Chopard

Acheta domesticus Linn.

Teleogryllus testaceus (Walker)

Plebeigryllus guttiventris (Walker)

Modicogryllus pallipes (Chopard)

Gryllodes signillatus (Walker)

Callogryllus orientalis (Bolivar)

C. bilineatus (Bolivar)

C. gravelyi (Chopard)

Cophogryllus maindroni Chopard

Itaropsis tenellas (Walker)

Velarifictorus brunneri (Chopard)

V. saussurei (Chopard)

V. fallax (Chopard)
Scapsipedoides macrocephalus Chopard
Meristoblemmus lobifrons Jones and Chopard
Pteronemobius fascipes (Walker)
Homonemobius monomorphus (Bolivar)
Parancmobius pictus Saussure
P. vicinus Chopard

Family—Myrmecophilidae

Myrmecophilus albicinctus (Chopard)

Family—Mogoplistidae

Derectaotus indicus (Chopard)

Family—Scleropteridae

Scleropterus coriaceus (Haan)

Family—Pteroplistidae

Pteroplistes platycleis (Bolivar)

Family—Phalangopsidae

Paragryllodes gravelyi (Chopard)
Arachnominus nietneri (Saussure)

Family—Trigonidiidae

Amusurgus oedemeroides (Walker)
Trigonidium humbertianum (Saussure)
Mctioche gigas (Bolivar)

Family—Eneopteridae

Itara minor Chopard
Calyptotrypus maindroni (Chopard)
Mnesibulus fuscipennis Chopard
Patiscus quadripunctatus Bolivar

LIST OF SPECIES|SUBSPECIES OF LEPIDOPTERA

[Distribution in South India not cited unformly in all literature consulted]

Sub order I *PHOPALOCERA* (Butterflies)

Family A. Papilionidae

1. *Graphium nomius nomius* Esper
2. *Graphium antiphates naira* Moore
3. *Graphium dosori eleius* Fruhstorfer
4. *Graphium agamemnon* Linnaeus
5. *Graphium sorpedon teredon* C. & R. Felder
6. *Atrophaneura hector* Linnaeus
7. *Atrophaneura pandiyana* Moore
8. *Atrophaneura aristolochiae* Fabricius
9. *Troides minos* Cramer
10. *Chilasa clytia dissimilis* Linnaeus
11. *Princeps liomedon* Moore
12. *Princeps polymnestor* Cramer
13. *Princeps helenus daksha* Hampson
14. *Princeps polytes romlus* Cramer
15. *Princeps dravidarum* Wood-Mason
16. *Princeps demodcus* Linnaeus

Family B. Pieridae

17. *Leptosia nina nina* Fabricius
18. *Delias eucharis* Drury
19. *Cepora nerissa phryne* Fabricius
20. *Cepora nadina remba* Moore
21. *Anapheis aurota* Fabricius
22. *Appias indra narendra* Moore
23. *Appias lyncida latifasciata* Moore
24. *Appias paulina paulina* Cramer
25. *Appias wardi* Moore
26. *Colotis eucharis* Fabricius
27. *Hebomoia glaucippe australis* Butler
28. *Valeria ceylanica ceylanica* C. & R. Felder
29. *Valeria valeria hippia* Fabricius
30. *Catopsilia crocale* Cramer

31. *Catopsilia pyranthe pyranthe* Linnaeus
32. *Catopsilia florella gnoma* Fabricius
33. *Eurema brigitta rubella* Wallace
34. *Eurema laeta laeta* Boisduval
35. *Eurema hecabe contubernalis* Moore
36. *Colias erate nilagiriensis* C. & R. Felder

Family C. Danaidae

37. *Idea malabarica malabarica* Moore
38. *Danaus chrysippus chrysippus* Linnaeus
39. *Danaus genutia genutia* Cramer
40. *Danaus limniace leopardus* Butler
41. *Danaus hamata dravidarum* Fruhstorfer
42. *Danaus aglea aglea* Stoll
43. *Euploea core core Cramer*
44. *Euploea sylvester coreta* Godart
45. *Euploea klugii kollari* C. & R. Felder

Family D. Satyridae

46. *Mycalesis penseus blasius* Fabricius
47. *Mycalesis visala orcha* Evans
48. *Mycalesis oculus* Marshall
49. *Mycalesis patnis junonia* Butler
50. *Lethe europa europa* Fabricius
51. *Lethe rohria neelgheriensis* Guerin
52. *Lethe drypetis todara* Moore
53. *Ypthima Yphthimoides* Moore
54. *Ypthima chenui* Guerin
55. *Ypthima ceylonica hubneri* Kirby
56. *Ypthima baldus madrasa* Evans
57. *Zipoetis saitis* Hewitson
58. *Melanitis Peda ismene* Cramer
59. *Melanitis phedima varaha* Moore
60. *Parantirrhoea marshalli* Wood-Mason
61. *Elymnias hypermnestra caudata* Butler

Family E. Amathusiidae

62. *Amathusia friderici friderici* Fruhstorfer
63. *Discophora lepida lepida* Moore

Family F. Acraeidae

64. *Acraea violac* Fabricius

Family G. Nymphalidae

65. *Charaxes polykena imna* Butler
66. *Charaxes fabius* Fabricius
67. *Charaxes schreiberi wardi* Moore
68. *Eriboea athamas agrarius* Swinhoe
69. *Apatura parisatis Camiba* Moore
70. *Euripus consimilis* Westwood
71. *Euthalia lepidea miyana* Fruhstorfer
72. *Euthalia garuda meridionalis* Fruhstorfer
73. *Euthalia lubentina arasada* Fruhstorfer
74. *Euthalia evelina laudabilis* Swinhoe
75. *Parthenos sylvia virens* Moore
76. *Limenitis procris* Cramer
77. *Pantoporia nefte inara* Doubleday
78. *Pantoporia Selenophera Kanara* Evans
79. *Pantoporia ranga karwara* Fruhstorfer
80. *Pantoporia perius* Linnaeus
81. *Neptis jumbah* Moore
82. *Neptis hylas varmona* Moore
83. *Neptis soma kallaura* Moore
84. *Neptis viraja kandra* Evans
85. *Neptis hordonia hordonia* Stoll
86. *Cyrestis thyodamas indica* Evans
87. *Hypolimnas bolina* Linnaeus
88. *Hypolimnas misippus* Linnaeus
89. *Doleschallia bisaltide malabarica* Fruhstorfer
90. *Kallima philarchus horsfieldii* Kollar
91. *Precis hierta hierta* Fabricius
92. *Precis orithya swinhoei* Butler
93. *Precis lemonias vaisya* Fruhstorfer
94. *Precis almana* Linnaeus
95. *Precis iphita* Cramer
96. *Vanessa cardui* Linnaeus
97. *Vanessa indica pholoe* Furhstorfer

98. *Vanessa Candoe Viridus* Evans
99. *Argynnis hyperbius castetsi* Oberthur
100. *Phalanta phalantha* Drury
101. *Cupha erymanthis maia* Fruhstorfer
102. *Cynthia erota saloma* Swinhoe
103. *Cirrochroa thais thais* Fabricius
104. *Cethosia nietneri mahratta* Moore
105. *Ergolis ariadne indica* Moore
106. *Ergolis merione merione* Cramer
107. *Ergolis merione taprobana* Westwood

Family H. Erycinidae

108. *Libythea myrrha carma* Fruhstorfer
109. *Abisara echerius prunosa* Moore

Family I. Lycaenidae

110. *Spalgis epeus epeus* Wesrwood
111. *Castalius rosimon rosimon* Fabricius
112. *Castalius caleta decidia* Hewitson
113. *Castalius ethion ethion Doubleday and* Hewitson
114. *Azanus jesous gamra* Lederer
115. *Neopithecops zalmora* Butler
116. *Everes lacturnus syntala* Cantlie
117. *Celastrina puspa lilacea* Hampson
118. *Celastrina carna albidisca* Moore
119. *Celastrina akasa mavisa* Fruhstorfer
120. *Celastrina limbata limbata* Moore
121. *Chilades laius laius* Cramer.
122. *Zizina otis indica* Murray
123. *Euchrysops enejus* Fruhstorfer
124. *Euchrysops pandava pandava* Horsfield
125. *Catochrysops strabo strabo* Fabricius
126. *Lampides boeticus* Linnaeus
127. *Jamides bochus bochus* Cramer
128. *Jamides alecto alocina* Swinhoe
129. *Nacaduba pactolus continentalis* Fruhstorfer
130. *Nacaduba sinhala* Ormiston
131. *Prosotas nora nora* Felder

132. *Curetis thetis thetis* Drury
133. *Curetis siva* Evans
134. *Iraota timoleon arsaces* Fruhstorfer
135. *Amblypodia anita dina* Fruhstorfer
136. *Narathura alea* Hewitson
137. *Narathura centaurus pirama* Moore
138. *Narathura amantes amantes* Hewitson
139. *Surendra vivarna biplagiata* Butler
140. *Loxura atymnus atymnus* Cramer
141. *Spindasis vulcanus vulcanus* Fabricius
142. *Spindasis lohita lazularia* Moore
143. *Zesius chrysomallus* Hubner
144. *Pratapa cleobis* Godart.
145. *Tajuria jehana* Moore
146. *Tajuria cippus cippus* Fabricius
147. *Tajuria maculata* Hewitson
148. *Charana jalindra macarita* Fruhstorfer
149. *Cheritra freja jaffra* Butler
150. *Rathindra amor* Fabricius
151. *Catapaecilma major callone* Fruhstorfer
152. *Zeltus amasa* Hewitson
153. *Deudorys epijarbas epijarbas* Moore
154. *Virachola isocrates* Fabricius
155. *Virachola perseghcla* Fruhstorfer
156. *Rapala lankana* Moore
157. *Rapala varuna lazulina* Moore
158. *Rapala manea schistacea* Moore
159. *Rapala iarbus sorya* Kollar
160. *Sinthusa chandrana*. Moore
161. *Bindahara phocides moorei* Fruhstorfer

Family J. Hesperiidae

162. *Bibasis jaina fergusonii* de Niceville
163. *Hasora chromus chromus* Cramer
164. *Hasora badra badra* Moore
165. *Badamia exclamationis* Fabricius
166. *Celaenorrhinus leucocera* Kollar
167. *Coladenia dan dan* Faricius

168. *Coladenia indrani indra* Evans
169. *Sarangesa dasahara davidsoni* Swinhoe
170. *Tagiades japetus obscurus* Mabille
171. *Tagiades japetus ravi* Moore
172. *Tagiades gana silvia* Evans
173. *Odontoptilum angulata angulata* Felder
174. *Caprona ransonnettii potiphera* Hewitson
175. *Spialia galba* Fabricius
176. *Baracus vittatus subditus* Moore
177. *Baracus vittatus hampsoni* Elwes and Edwards
178. *Ampittia dioscorides diascorides* Fabricius
179. *Aeromachus stigmata obsoleta* Moore
180. *Aeromachus jhora creta* Evans
181. *Aeromachus dubius dubius* Elwes and Edwards
182. *Acromachus pygmacus* Fabricius
183. *Halpa homolea hindu* Evans
184. *Lambrix salsala luteipalpis* Plotz
185. *Psolos fuligo subfasciatus* Moore
186. *Notocrypta feisthamelii alysos* Moore
187. *Udaspes folus* Cramer
188. *Suastus gremius gremius* Fabricius
189. *Hyarotis adrastus praba* Moore
190. *Quedara basiflava de* Niceville
191. *Gangara thyrsis thyrsis* Fabricius
192. *Matapa aria* Moore
193. *Taractrocera maevius sagara* Moore
194. *Potanthus omaha omaha* Edwards
195. *Telicota ancilla bambusae* Moore
196. *Pelopidas mathias mathias* Fabricius
197. *Pelopidas conjuncta narooa* Moore
198. *Polytremis lubricans lubricans* Herrich-Schaffer

SUBORDER II. *HETEROCERA (Moths)*

Family K. Saturniidae

199. *Cricula trifenestrata* Helfer

Family L. Eupterotidae

200. *Eupterote Fabia* Cramer

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Family M. Ctenuchidae

201. *Eressa affinis* Moore

Family N. Zygaenidae

202. *Cyclosia papilionaris australinda* Hampson

Family O. Noctuidae

203. *Craterestra albicosta* Hampson
204. *Agonista reducens* Walker
205. *Cyclodes omma* van der Hoèvan
206. *Lagoptera submira* Walker
207. *Anua trapezium* Guenee
208. *Dordura aliena* Walker
209. *Baiana divulsa* Walker
210. *Borsippa sejuncta* Walker
211. *Phytometra impulsa* Walker
212. *Pasipeda rufipalsis* Walker
213. *Calesia fuscicorpus* Hampson
214. *Calesia fasciculosa* Walker
215. *Zethes pictipennis* Hampson
216. *Capnodes ceylonica* Walker
217. *Hypena elongalis* Fabricius

Family. P. Uraniidae

218. *Acropteris ciniferaria* Walker

Family O. Epipelmidae

219. *Orudiza protheclaria* Walker

Family R. Geometridae

220. *Corymica deducata* Walker
221. *Eurytaphria undilineata* Warren
222. *Macaria ozararia* Walker
223. *Boarmia comparataria* Walker
224. *Noreia perdensata Walker*

225. *Rambara saponaria* Guenee
226. *Anisodes monetaria* Guenee
227. *Euschema percota* Swinhoe
228. *Chlorodontopera devaxata* Walker
229. *Aporandria specularia* Guenee

Family S. Pyralidae

230. *Crambus anticellus* Walker
231. *Charltona cervinella* Moore
232. *Charltona inconspicuella* Moore
233. *Tyndis hypotialis* Swinhoe
234. *Diaphania marginata* Hampson
235. *Diaphania glauculalis* Guenee
236. *Diaphania bicolor* Swainson
237. *Glyphodes nilgirica* Hampson
238. *Pygospila costiflexalis* Guenee
239. *Ischnurges gratiosalis* Walker
240. *Pionea albicastalis* Swinhoe

FAUNISTIC

PAPERS* ON LEPIDOPTERA FROM KERALA AT HANI

1. Fergusson H. S. 1891. A list of the butterflies o Travancore

   Bombay nat. Hist. Soc. 6:432-48

2. Peile, H. D. 1937. *A guide to collecting butterflies of India—London*

(*Vide* list on p. 255)

*Other reference also consulted for compilation of curren names of elements in the above list, as much as possible

LIST OF RECORDED HYMENOPTERA

ORDER: *Hymenoptera*

Family—Xylocopidae

Xylocopa (Koptor losoma *lencothorax* (Degear)

Family—Chrysodidae

Stilbum cyanurum Forst

Family—Scolidae

Campsomeris collaris Fab.
Scolia histrionica Fab.
Scolia thyrianthina Herby
Megascolia (Legiscolia) azuria hindostana Micha

Family—Sphegidae

Ampulex compressa Fab.
Sceliphron violaceum (Fabr.)
Tachytes modesta Smith

Family—Pompilidae

Salins irridipenis Smith

Family—Formicidae

Solenopsis geminata (Fabr.)
Leptocenys (Lahopelta) diminuta Smith

Family—Eulophidae

Tetrastichus atriclavus Group
Pediobius epilachnae Roh

Family—Braconidae

Aphrostrobracon flacipennis Ashm.
Bracon alblineatus Cam.
Phanerotoma pendecasisella Cam.

Family—Icheumonidae

Goryphus nursei rorl.
Syzenetus annulipes Cam.
Hemiteles spilopterus rorl.
Tarytia flaco—orbitalis Cam.
Astomaspis fuscipennis (Cam.)
Strictopisthus plusiaephilus Viereek

Family—Apidae

Apis indica Fabr.

ORDER—Coleoptera

Family—Rhysodiidae

1. *Rhysodes malabaricus* Arrow

Paussidae

Pasussus seriesetosus Wasm.

CICINDELIDAE

1. *Neocollyris maindroni* Horn.
2. *Neocollyris andrewesi* Horn.
3. *Derocrania longesulcata* Horn.
4. *Prothyma paradoxa* Horn.
5. *Cicindela tetragrammica* Choud
6. *Cicindela corticata* Putz.
7. *Cicindela sumatrensis* Hbst.
8. *Cicindela duponti* Dej.
9. *Cicindela tramiltonia* Thoms.
10. *Cicindela haemorrhoidalis* Wied.
11. *Cicindela colligramma* Schaum
12. *Cicindela striolata* Illiger.
13. *Cicindela candellata* Dej.
14. *Cicindela catena* F.

Subfamily—Oxytelinae

Tribe—Piestine

1. *Holosus longipennis* Cameron

Tribe—Osoriini

2. *Paragonus birmanus* Fauvel

Subfamily—Sterinae

3. *Stenus (Hypostenus) pulcher* Motschulsky
4. *S. (H) angusticollis* Eppelsheim
5. *S. (H) decanus,* Sp. nov.
6. *S. (H) albidicornis* Bernhauer

Subfamily—Paederinae

Tribe—Pinophilini

Tribe—Paederine

7. *Paederus variicornis* Fauvel
8. *P. (Pseudopaederus) mussardi* Biswas & Sengupta
9. *P. pondaicus* Fauvel
10. *P. kuluensis* Bernhauer
11. *Scopaeus andrewesi* Cameron
12. *Cryptobium elephas* Fauvel
13. *Cryptobium bhattacharyyae,* sp. nov.

Subfamily—Staphylininae

Tribe—Xantholinini

14. *Indoscitalinus anachoreta* (Erichson)

Tribe—Staphylinini

15. *Philonthus castaneus* Gemm.

Tribe—Quediini

16. *Cyrtothorax vulneratus* Fauvel

Subfamily—Aleocharinae

17. *Zyrus (Rhynchodonea) Waageni* (Eppelsheim)

Scarabaeidae

Subfamily—Rutelinae

1. *Popillia laevis* Baron
2. *P. propinqua* Arrow
3. *Micranomala indica* Arrow
4. *Anomala robusta* Ohaus

5. *A. communis* Burm.
6. *A. dussumieri* Blanch.
7. *Prodoretus malabariensis* Ohaus

Subfamily—Cetoniinae

8. *Macronota bufo* Arrow
9. *M. sanio* (Jauson)
10. *Warycius opalus* Dup.
11. *Dioeros bimacula* (Wied.)
12. *Heteroffhina micans* (Guer.)
13. *Protaetia pretiosa* (Nonfr.)
14. *Clinteria caliginosa* Janson
15. *Oreoderus gravis* Arrow

Subfamily—Dynastinae

16. *Xylotrupes gideon* (Linnaeus)

Subfamily—Coprinae

17. *Gymnopleunes keenigi* (Fabricius)
18. *G. gemmatus* Harold
19. *G. dejeani* Cast.
20. *Sisyphus hirtus* Wied.
21. *Catharsius sagax* (Quens.)
22. *Copris indicus* Gillet
23. *C. signatus* Walk.
24. *C. davisoni* Wat.
25. *Onthophagus histrix* Bouc
26. *O. vividus* Arrow
27. *Onitis virens* Lansb.

Chrysomelidae

1. *Oides affinis* Jacoby
2. *Hoplasoma unicolor* (Illiger)
3. *Aulacophora parambikulamensis* Maulik
4. *A. nilgiriensis* Jacoby
5. *A. foveicollis* (Lucas)
6. *Decretina wallardia* Maulik
7. *D. travancorensis* Maulik

8. *Monolepta indica* Jacoby
9. *M. analis* Weise

Subfamily—Alticinae

10. *Philopona decemmaculata* Maulik
11. Hyphasis nilapita (Maulik)

Subfamily—Hispinae

12. *Laciochila macilentia* (Gestro).
13. *Leptispa distincta* (Gestro)
14. *Gonophora brevicornis* Weise
15. *Dactylispa dilaticornis* (Duvivier)
16. *D. corpulenta* Weise
17. *D. filiola* Weise
18. *D. severini* (Gestro)
19. *D. Soror* Weise
20. *Platypria echidna* Guerin
21. *P. hystrix* (F.)

Subfamily—Casidinae

22. *Epistictina weisei* Spaeth
23. *E. reicheana* Guerin
24. *Aspidomorpha sanctaecrucis* (F.)
25. *A. furcata* Thunberg
26. *Laccoptera quadrimaculata* (Thunberg)
27. *L. tredecimpunctata* (F.)
28. *Cassida syrtica* Boheman
29. *C. circumdata* Herbst
30. *Chirida binduta* Maulik
31. *C. novemkalankita* Maulik
32. *C. bipunctipennis* (Boheman)
33. *C. bipunctata* (L.)

Subfamily—Criocerinae

34. *Lema balyana* Jacoby
35. *L. intacta* Jacoby
36. *Lema wallardiensis* Jacoby
37. *L. subiridea* Jacoby

38. *L. cerea* Jacoby
39. *L. nitidissima* Jacoby

Sub family—Clytrinae

40. *Gynandrophthalma wallardiensis* Jacoby
41. *Diapromorpha quadripunctata* (Jacoby)

Sub family—Cryptocephalinae

42. *Coenobius nigripes* Jacoby
43. *Cryptocephalus simulans* Jacoby

Sub family—Eumolpinae

44. *Nodostoma wallardiense* Jacoby
45. *N. congregatum* Jacoby
46. *N. dormeri* Baly
47. *N. nigrolineatum* Jacoby
48. *Dermorhytis viridinitens* Jacoby
49. *Scelodonta immaculata* Jacoby
50. *Xanthophorus Carinatus* Jacoby
51. *Hyperaxis penicillata* Jacoby
52. *Colasposoma coromandeliana* Jacoby
53. *Platycorynus amethystinus* Marshall
54. *Colaspoides melanocephala* Jacoby

Cerambicidae

1. *Logaeus subopacus* Waterhouse Travancore
2. *Priotynannus mordax* White
3. *Acanthocerus serraticornis* Oliv.
4. *Dandamis nigropunetatus* Auriv.
5. *Zoodes compressus* Fab.
6. *Plocaederus ferrugineus* Linn.
7. *Derolus demissus* Pascoe Tranqueba
8. *Xoanodera amoena* Pase.
9. *Rosalia laterita* Hope.
10. *Purpuricenus sanguinolentus* Oliv.
11. *Zonopterus consanguineus* Ritsema.
12. *Polyzonus tetraspilotus* Hope
13. *Paehylocerus crassicornis* Oliv.
14. *Xylotrechus subsentellatus* Chev.

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Curculionidae

1. *Dereodus sparsus* Boh. (Trivandrum)
2. *Astycus oculatus* var. *levicollis* Marshall (Travancore)
3. *Astycus femoralis* Fhs. (Travancore, Trivandrum)
4. *Sympiezomias hispidus* Mshl. (Cochin)
5. *Sympiezomias dicipiens* Mshl. (Travancore)
6. *Episomus raucus* Fst. (Trivandrum)
7. *Episomus obuncus* Mshl. (Trivandrum)
8. *Myllocerus delicatulus* Boh. (Cochin State)

Family—Helotidae

1. *Helota Guerini* Hope (Travancore)

Family—1. Rhysolidae

1. *Omaglymmius silentsis* Saha and Biswas n. sp.
2. *O. malabarensis* (Arrow)

Family—2. Carabidae

1. *Oxylobus quadricollis* Chaudoir.
2. *O. menatus* Andrews
3. *O. silenticus* Saha
4. *Chalenius luculentus* Andrews
5. *Ch. bimaculatus* Dejean
6. *Diceromerus orientalis* (Motschulsky)
7. *Morion orientale* Dejean
8. *Gnathaphanus* sp.
9. *Tetragonoderus* sp.
10. *Microlestes inconspicuas* Schmidt-Goebel
11. *Dromius orthogonoides* Bates
12. *Coptodera interrupta* Schmidt—Goebel.
13. *Cymindoides* sp.
14. *Aephnidius rubidus* Andrews
15. *Pogonoglossus truncatus* Andrews
16. *Melaenus piger* (F)

Family—3. Cicindelidae

1. *Neocollyris shyamrypi* Saha and Haldar
2. *Derocrania brevicollis* Chaudoir

3. *Cicindela tetragrammica* Chaudoir
4. *Cicindela viridilabris severini* Horn.
5. *Cicindela umbropolila* Horn.

Family—4. Staphylinidae

1. *Paederus sondaicus* Fauvel (Nilgiris, Belgaum, Nagargali, Khanapur, Sampgaon and Khasia Hills).
2. *Paederus (Pseudopaederus) Mussardi*, n. sp.
3. *Paederus variicornis* Fauvel—Nilgiris
4. *Paederus kuluensis* Bernhauer—Kulu (HP)
5. *Stenus* (H) *pulcher* Motschulsky—Nilgiri Hills and U. P.
6. *Sternus (H) angusticollis Eppelsheim*—Assam and U. P.
7. *Stenus* (H) · ? *monomerus* Fauvel—Sri Lanka
8. *Holosus longipennis* Cameron—Nilgiri Hills
9. *Cryptobium elephas* Fauvel—Nilgiri Hills
10. *Cryptobium* sp.
11. *Palaminus* sp. nnrr. *monticola* Cameron—Sri Lanka
12. *Indescicalinus anachoreta* (Erichson)—Widely distributed in India.
13. *Cyrtothorax* sp. nr. *signatus* Cameron—Sri Lanka
14. *Philonthus eastaneus* Gemm. et. *Har.*
15. *Philonthus* sp. nr. *donckieri* Bernhauer
16. *Stenus* sp.
17. *Scopaeus andrewesi* Cameron-Nilgiri Hills
18. *Zyras* spp.

Family—5. Lucanidae

1. *Dorcus candezei* (Boil)

Family—6. Passalidae

1. *Pleurarius brachyphyllus* Stolizka
2. *Episphenus neelgheriensis* (Erichson)
3. *Episphenus comptoni* (Kemp.)
4. *E. indicus* (Stoliczka)

Family—7. Scarabadidae

1. *Mycteristes auritus* Arrow
2. *Macronota bufo* Arrow
3. *Macronota flavosparsa* Waterhouse
4. *Macronota sannio* (Janson)
5. *Macronota perraudieri* (Fairmaire)
6. *Trigonophorus delesscrti* (Guerin)
7. *Xylotrupes gidcon* (Linnaeus)
8. *Pipillia* lucida Newman
9. *Anomala armata* (Arrow)
10. *Anomala vittilatetera* Arrow
11. *Autoscrica atratula* Dalla Jorre
12. *Autoscrica brevis* Blanchard
13. *Autoserica trangueharica* Brenske
14. *Autoseraica mutabilis* Olivier
15. *Cathersius molossus* (Linnaeus)
16. *Cathersius granulotus* Sharp
17. *Copris indicus* Gillet
18. *Cacoobius neridionalis* Boucomont
19. *Caccobius uniocornis* (Fabricius)
20. *Onthophagus sahai* sp. n.
21. *Onthophagus fasciatus* Boucomont
22. *Onthophagus andressi* Arrow
23. *Onthophagus ensifer* Boucomont
24. *Onthophagus bifasciatus* (Fabricius)
25. *Onthophagus unifasciatus* (Schaller)
26. *Onthophagus keralus* sp. n.
27. *Onthophagus castetsi* Lansberge
28. *Onthophagus tarunus* sp. n.
29. *Phaeosoma triste* Arrow
30. *Onitis singhalensis* Lansberge
31. *Hybosorus* sp.

Family—8. Geutrupidae

35. *Atherius* sp.

Family—9. *Chrysomelidae*

1. *Lema* sp.
2. *Cryptocephalus lefevrei* Jacoby
3. *Cryptocehalus* sp.
4. *Basilepta* sp. (1)
5. *Basilepta fulvicorne* (Jacoby)
6. *Basilepta* sp. (2)
7. *Colasposoma robustum* Jacoby
8. *Tricliona picea Jacoby*
9. *Hoplasoma nilgiriensis Jacoby*
10. *Hoplasoma unicolor* (Illiger)
11. *Hoplasoma diluticornis* Jacoby
12. *Aulacophora nilgiriensis* Jacoby
13. *Aulacophora cincta* (Fabricius)
14. *Aulacophora Cruenta* (Fab.)
15. *Aulacophora lewisii* Baly
16. *Mimatracella hirsuta* Jacoby
17. *Derectina* sp.
18. *Monolepta signata* (Oliver)
19. *Plagiodera divisa* Jacoby
20. *Nonarthra birmanica* (Jacoby)
21. *Psylliodes viridana* Motschulsky
22. *Hyphasis intermedia* Jacoby
23. *Euphitrea indica* Jacoby
24. *Chlaenosoma metallica* Jacoby
25. *Chaetocnema (Chaetocnema) Pusaensis* Maulik
26. *Chaetocnema (Chaetocnema) britinghami* Baly
27. *Chaetocnema (Tlanoma) basalis* (Baly)
28. *Nisotra madurensis* Jacoby
29. *Nisotra* sp.
30. *Longitarsus belgaumensis* Jacoby
31. *Luperomorpha vittata* Duvivier
32. *Sebaethe pallidicincta* Jacoby
33. *Sebaethe nigritarsis* Jacoby
34. *Phygasia silacea* (Illiger)

35. *Hispa andrewesi* (Weise)
36. *Dactylispa Krishna* Maulik
37. *Dactylispa spinipes* Weise
38. *Dactylispa pilapada* Maulik

Family—10. Silvanidae

1. Indophanus dakshinus Pal. Gen. et., sp., nove

MOLLUSCA OCCURING IN KERALA STATE

Land molluscs of Kerala State

Class—Gastropoda

Order—Mesogastropoda

Family—Cyclophoridae

Craspedotropis bilirata Beddome
Micraulax scabra Theobald
Ditropis beddomei Blanford
Theobaldius deplanatus (Pfeiffer)
T. ravidus (Benson)
Cyclophorus nilagiricus (Benson)
Pterocyclus cumingi (Pfeiffer)
P. pseudocumingi Mollendorff
Pearsonia travancorica (Blanford)
Cyathopoma latilabre Beddome
C. travancoricum Beddome
C. wynaadense Blanford
Mychopoma birsutum Blanford
Tortulosa albescens (Blanford)
T. calcadensis (Blanford)
T. *tortuosa* (Chemnitz)
Alycaeus footei Blanford
Nicida nitidula (Blanford)

Order—Stylommatophora

Family—Enidae

Ena nilagirica (Pfeiffer)
Cerastus densus (Pfeiffer)

Rachis pulcher (Gray)
R. punctatus (Anton)

Family—Glessulidae

Glessula dikrangense Godwin—Austen
G. tornensis Blanford
G. textilis (Blanford)
G. subperrottetti Beddome
G. anamullica (Blanford)
G. deshayesi (Pfeiffer)
G. travancorica Gude
G. oreas (Reeve)
G. gemma (Reeve)
G. malabarica Gude
G. gracilis Beddome
G. filosa Blanford

Family—Subulinidae

Opeas gracile (Hutton)

Family—Ariophantidae

Ariophanta belangeri (Deshayes)
A. basilessa (Benson)
A. beddomii (Blanford)
A. gassii (Blanford)

Indrella ampulla (Benson)

Euplecta semidecussata (Pfeiffer)
E. travancorica (Benson)
E. indica (Pfeiffer)
E. albizonata (Dohrn)
E. acuducta (Benson)
Macrochlamys woodians (Pfeiffer)
M. villipensa (Benson)
Mariaella dussumieri Gray
M. beddomei (Godwin-Austen)
Pseudaustenia atra (Godwin-Austen)

Satiella dekhanensis (Godwin-Austen)
S. levidensis (Godwin-Austen)
S. compressa Godwin-Austen and Blanford
S. pertenuis Godwin-Austen and Blanford

Family—Camaenidae

Corilla anax (Benson)
Planispira proxima (Ferussac)
Apatetes bourdilloni (Theobald)

Family—Streptaxidae

Streptaxis watsoni W & H. Blanford
S. personatus Blanford
Ennea bicolor (Hutton)

FRESHWATER MOLLUSCS OF KERALA STATE

Class—Gastropoda

Order—Archaeogastropoda

Family—Neritidae

Neritina (Destia) violacea (Gmelin)

Order—Mesogastropoda

Family—Viviparidae

Bellamys bengalensis (Lamarck)
B. dissimilis (Muller)

Family—Pilidae

Pila virens (Lamarck)

Family—Pilidae

Iravadia funerea Preston

Bithyniidae

Gabbia travancorica (Benson)
Digoniostoma pulchella (Benson)

Family—Thiaridae

Thiara (Thiara) scabra (Muller)
T. (Sermyla) requeti (Grateloup)
T. (Melanoides) tuberculata (Muller)

Sulcospira hugeli (Philippi)
Paludomus (Paludomus) inflatus Brot
P. (P) rotunde Blanford
P. (P) lanschauricus (Gmelin)
P. (Philopotamis) sulcatus Reeve
P. (Stomatodon) stomatodon Benson

Order—Basommatophora

Family—Lymnaeidae

Lymnaea acuminata Lamarck

Form rufescens Gray

Lymnaea acuminata Lamarck f. *gracilier* Martens
f. *hians* Sowerby
f. *typica* Lamarck
f. *patula* Troschel

Lymnaea luteola Lamarck f. *typica* Lamarck
f. *ovalis* Gray
f. *succinea* Deshayes

Family—Ancylidae

Ferrissia verruca (Benson)
F. tenuis (Bourguignat)

Family—Planorbidae

Indoplanorbis exustus Deshayes
Gyraulus convexiusculus (Hutton)

Class—Bivalvia

Order—Unionoida

Family—Unionidae

Lamellidens corrianus (Lea)
L. marginalis (Lamarck)

Order—Veneroida

Family—Corbiculidae

Corbicula annandalei Prashad
Corbicula striatella Deshayes
Villorita cornucopia Prashad

V. cyprinoides (Gray)
Geloina erosa (Solander)
G. bengalensis (Lamarck)

Family—Pisidiidae

Sphaerium indicum Deshayes

List of Marine Shells for Kerala Coast.

Class—Gastropoda

Order—Archaeogastropoda

Family—Fissurellidae

Puncturella (Cranopsis) asturiana Smith
P. (C) indica Smith
Diodora funiculata (Reeve)
Fissurella delicata Smith
Clypidina (Clypidina) notata (Linnaeus)

Patellidae

Cellana radiata radiata (Born)

Family—Trochidae

Euchelus asper (Gmelin)
Umbonium vestiarium (Linnaeus)
Solariella utkalensis Ray
Trochus (Infundibulum) radiatus Gmelin

Family—Turbinidae

Turbo brunneus (Roding)

Family—Neritidae

Nerita albicilla Linnaeus
Nerita plicata Linnaeus
Neritina (Dostia) violacea (Gmelin)

Family—Littorinidae

Littorina (Littoraria) undulata Gray
Littorina (Littorinopsis) Scabra scabra (Linnaeus)
Nodilittorina (Granulittorina) millegrana (Philippi)

Family—Planaxidae

Planaxis sulcatus (Born)

Potamididae

Cerithidea (Cerithideopsilla) cingulata (Gmelin)
Telescopium (Telescopium) telescopium (Linnaeus)

Family—Cerithidae

Glypeomorus moniliferus (Kiener)

Family—Epitonidae

Epitonium subcasta (Smith)
Epitonium bengalensis (Smith)

Family—Xenophoridae

Xenophora pallidula (Reeve)

Family—Capulidae

Capulus lissus Smith

Family—Calyptracidae

Calyptraea extinctorium Lamarck

Family—Strombidae

Strombus (Dolomena) plicatus sibbaldi Sowerby
Tibia fusus (Linnaeus)

Family—Naticidae

Natica tigrina (Roding)
N. qualtieriana Recluz

Family—Cymatiidae

Cymatium pileare (Linnaeus)
Distortrix Cuncellinus (Roissy)

Family—Ficidae

Ficula ficoidea Lamarck

Order—Neogastropoda

Family—Muricidae

Cronia margariticola Broderip
Thais tissoti (Petit)
Murex serratospinosus Dunker
Murex tribulus Linnaeus
Mancinella buto (Lamarck)
Purpura rudolphi (Lamarck)

Family—Buccinidae

Babylonia spirata (Linnaeus)
Cantharus undosus (Linnaeus).

Family—Fasciolariidae

Fusinus rubrolineatus (Sowerby)

Family—Pyrenidae

Columbella (Mitrella) supraplicata Smith

Family—Nassariidae

Nassarius ceylanicus (Nevill)

Family—Marginellidae

Nassarius stoliczkianus (Nevill)

Family—Marginellidae

Marginella quilonica Melvili

Family—Cancellariidae

Cancellaria cretacea Smith

Family—Mitridae

Mitra (Nebularia) punctostriata A. Adams

Family—Turridae

Paradrillia agalma (Smith)
Pontiothauma mirabile Smith
Clavatula navarchus (Mevil & Standen)
Pleurotoma (Bathytoma) oldhami Smith
Pleurotoma optata Smith
Pleurotoma praecipua Smith
Pleurotoma thurstoni Smith
Cochlespira travancorica travancorica (Smith)
Gemmula vagata (Smith)

Family—Conidae

Conus acutangulus Lamarck
C. australis Holten
C. figulinus Linnaeus
C. inscriptus Reeve
C. marmoratus Linnaeus

C. planiliratus Sowerby
C. tessulatus Born
C. vexillum Gmelin

Order—Entomotaenata

Family—Pyramidellidae

Pyrgulina humilis (Preston)
P. rembhaensis (Preston)

Order—Nudibranchia

Family—Pleurobranchidae

Pleurobranchus (Susania) ceylonicus

Family—Hexabranchidae

Hexabranchus flammulatus (Quoy and Gaimard)

Class—Bivalvia

Order—Nuculoida

Family—Nuculidae

Nucula fultoni Smith

Family—Nuculanidae

Nuculana mauritiana (Sowerby)

Order—Arcoida

Family—Arcidae

Anadara (Scapharca) indica (Gmelin)
Barbatia incerta Smith
Barbatia innocens Smith

Family—Limopsidae

Limopsis indica Smith

Order—Mytiloida

Family—Mytilidae

Perna indica Kuriakose and Nair
Perna viridis (Linnaeus)
Modiolus striatulus (Banley)
M. undulatus (Dunker)

M. tulipa (Lamarck)
Lithophaga nigra (d'orbigny)

Order—Pterioida

Family—Pectinidae

Amusium investigatoris Smith

Family—Limidae

Lima indica Smith
Lima subtilis Smith

Family—Ostreidae

Saccostrea cucullata (Born)
Crassostrea gryphoides (Schotheim)

Order—Veneroida

Family—Lucinidae

Lucina bengalensis Smith

Family—Ungulinidae

Cryptodon investigatoris Smith

Family—Corbiculidae

Villorita cornucopia Prashad
V. cyprinoides Gray
V. cyprinoides var. *Cochinensis* (Hanley)
V. delioatula Preston
Corbicula cochinensis Preston

Family—Mactridae

Standella pellucida (Gmelin)

Family—Solelidae

Solen lamarckii Deshayes

Family—Cultellidae

Neosolen aquae-dulcioris Ghose

Family—Tellinidae

Tellina myseoformis Sowerby
T. tranvancorica Smith
T. pinguish Hanley

Family—Psammobiidae

Psammobia amethystus (Wood)

Family—Semelidae

Abra affinis Smith
Theora opalina (Hinds)

Family—Veneridae

Meretrix Casta (Chemnitz)
M. casta var. ovum (Hanley)
M. meretrix (Linnaeus)
M. meretriz var *aurora* Hornell
M. meretrix var. *zonaria* (Lamarck)
Marcia recens Chemnitz
Marcia pinguis Schroter
Tapes turgida (Lamarck)
Timoclea cochinensis (Sowerby)
Sunetta solanderii Gray
Dosinia insularum Fischerpiette Delmar
D. Katiawarensis Fischerpiette Metivier
D. bruguieri (Hanley)
Paphia malabarica (Schroter)
Dosinia histrio (Gmelin)
D. cretacea (Reeve)
Callista erycina (Linnaeus)
Venerupis macrophylla Deshayes

Order : Myoida

Family—Pholadidae

Martesia striata (Linnaeus)
Joannetia commingii (Sowerby)
J. globulosa (Quoy & Gimard)
Pholas orientalis (Gmelin)

Family—Teredinidae

Bankia carinata Gray
Nausitora hedleyi Schepura

Dicyathifer manni (Wright)
Lyrodus pedicellatus (Quatrafages)

Order—Pholadomyoida

Family—Myochamidae

Myodora quadrata Smith

Family—Cuspidariidae

Cuspidaria annandalei Preston
C. cochinensis Preston
Myonèra bicarinata Smith

Family—Vesicomyidae

Vesicomya brevis : Smith
V. indica Smith

Family—Verticordiidae

Euciroa eburnea (Woodmason & Alcock)

Family—Gastrochaemidae

Gastrochaena gigantea (Deshayes)

Class—Scaphopoda

Family—Dentaliidae

Dentalium cornubovis Smith
D. eburneum Linnaeus
D. magnificum Smith
D. quadrapicale Smith
D. Shoplandi Jousseaume

Class—Cophalopoda

Family—Sepiidae

Sepiella inermis (Ferrussac & d' Orbigny)
Swpia aculeata Ferrussac and d' Orbigny
S. arabica Massy

Family—Oxtopodidae

Cistopus indicus Gray
Bérrya keralensis Ooman
Octopus maccropus Risso

O. rugosus (Bose)
O. areolatus

Family—Opisthoeeuthidae
Opisthoteuthis philippi Ooman
Family—Cranchiidae
Liocranchia reinhardi (Steenstrup)
Family—Enoploteuthidae
Abralia endamanica Goodrich
Abraliopis gilchristi (Robson)

LIST OF FRESHWATER FISHES OF KERALA STATE

Family—Clupeidae
Nematalosa nosus (Bl.)
Anadontostoma chacunda (Ham.)
Family—Notopteridae
Notopterus notopterus (Pallas)
Family Cyprinidae
Chela laubuca (Ham.)
Oxygaster clupeoides (Bl.)
Barilius barila Ham.
Barilius bendclisis (Ham.)
Barilius gatensis (V.)
Danio nequipinnatus Mecl.
Esomus danrica (Ham.)
Rasbora daniconius (Ham.)
Rasbora rasbora (Ham.)
Amblypharyngodon mola Blkr.
Tor khudree (Sykes)
Tor mussullah (Sykes)
Puntius amphibia (V.)
Puntius carnaticus (Jerdon)
Puntius conchonius (Ham.)
Puntius curmuca (Ham.)
Puntius filamentosus (V.)

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Puntius jerdoni (Day)
Puntius kalus (Sykes)
Puntius sarana sarana (Ham.)
Puntius ticto (Ham.)
Cirrhinus cirrhosa (Bl.)
Cirrhinus fulungee (Sykes)
Cirrhinus mrigala (Ham.)
Cirrhinus reba (Ham.)
Labeo bafa (Ham.)
Labeo boggut (Sykes)
Labeo calbasu (Ham.)
Osteobrama vigarsii (Sykes)
Rohtea ogilbii Sykes
Thynnichthys sandkhal (Sykes)

Family : Siluridae

Ompok bimaculatus (Bl.)
Silurus cochinensis V.
Wallago attu (Schn.)

Family—Heteropnenstidae

Heteropnenstes fossilis (Bl.)

Family : Clariidae

Clarias batrochus (L.)

Family : Bagridae

Mystus cavasius (Ham.)
Mystus gulio (Ham.)
Mystus seenghalas (Sykes)
Mystus vittatus (Bl.)

Family : Sisoridae

Rita kuturnce (Sykes)
Bagarius bagarius (Ham.)

Family : Belonidae

Xenentodon cancila (Ham.)

Family : Cyprinodontidae

Aplicheilus lineatum (V.)
Oryzius melastigmus (Mccl.)

Family—Channidae

Channa arientalis (Ham.)
Channa marulius (Ham.)
Channa striatus (Bl.)

Family—Chandidae

Chanda ranga Ham.
Chanda thomassi Day

Family—Gobiidae

Glossogobius giuris (Ham.)

Family : Anabantidae

Analas testudineus (Bl.)

Family—Mastacembelidae

Mastacembelus armatus (Lac.)
Mastacembelus pancalus (Ham.)
Macroguathus aculeatum (Bl.)

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LIST OF MAMMALS OF KERALA STATE

Scientific Name	*Common Name*
Loris tardigradus (Linnaeus)	Slender Loris
Macaca radiat Geoffroy	Bonnet Monkey
Macaca silenus (Linnaeus)	Lion-tailed Macaque
Presbytis entellus (Dufresne)	Langur
Prebytis johni (Fischer)	Nilgiri Langur
Manis crassicandata Gray	Indian Pangolin
Canis aureus Linnaeus	Asiatic Jackal
Vulpes bengalensis (Shaw)	Bengal Fox
Cuon alpinus Pallas	Indian Wild Dog
Melursus ursinus (Shaw)	Sloth Bear
Martes gwatkinsi Horsfield	South Indian Yellow throated Marten
Lutra lutra (Linnaeus)	Common Otter
Lutra perspicillata Geoffrey	Smooth-coated Indian Otter
Aonyx cinerea (Illiger)	Oriental small-clawed Otter
Viverra megaspila Blyth	Large-spotted Civet
Viverricula indica (Desmarest)	Small Indian Civet
Paradoxurus hermaphroditus (Pallas)	Common Palm Civet
Paradoxurus jerdoni Blanford	Jerdon's Palm Civet
Perpestes edwardsi (Geoffroy)	Indian Grey Mongoose
Perpestes fuscus Waterhouse	Indian Brown Mongoose
Perpestes vitticollis Bennet	Stripe-necked Mongoose
Felis chaus Guldenstaedt	Jungle Cat
Felis bengalensis Kerr	Leopard Cat
Panthera pardus (Linnaeus)	Leopard
Panthera tigris (Linnaeus)	Tiger
Elephas maximus Linnaeus	Indian Elephant
Sus scrofa Linnaeus	Wild Boar
Tragulus meminna (Erxleben)	Mouse—deer

Muntiacus muntjak (Zimmermann)	Barking Deer
Axis axis (Erxleben)	Spotted Deer
Cervus unicolor Kerr	Sambhur
Bos gaurus H. Smith	Gaur
Hemitragus hylocrius (Ogilby)	Nilgiri Tahr
Pepus nigricollis Cuvier	Black-naped Hare
Hystrix indica Kerr	Indian Crested Porcupine

Besides the above large mammals, among the small mammals (Insectivores, Chiropteran and rodents), the Savi's Pygmy Shrew, *Suncus etruscus* (Savi); the Indian Flying Fox, *Pteropus giganteus* (Brunnich); the short-nosed Fruit Bat, Cynapterus sphinx (Vahl); the Fuwous Fruit Bat, *Rousettus* leschenautti (Desmanest); the Indian False Vampire, *Megadermalyra* Geoffrey; the House Rat, *Rattus rattus* (Linnaeus); the House Mouse, *Mus. Musculus* Linnaeus; the Lesser-Bandi-Coot Rat *Bandicota bengalensis* (Gray) are most common.

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LIST OF AMPHIBIANS RECORDED FROM KERALA STATE

Class—Amphibia

Order—Anura

Family—Ranidae

Genus—*Rana Linnaeus,* 1766

	English Name
Rana aurantiaca Boulenger	—
Rana beddomii (Gunther)	Beddome's Frog
Rana brachytarsus (Gunther)	—
Rana breviceps Schneider	Indian Burrowing Frog
Rana brevipalmata Petgos	—
Rana crassa Jerdon	Jerdon's Bull Frog
Rana Curtipes Jerdon	—
Rana Cyanophlyctis Schneider	Skipping Frog
Rana diplosticts (Gunther)	—
Rana dobsonii (Boulenger)	Dobson's Burrowing Frog
Rana hexadactyla Lesson	Indian Pond Frog
Rana Keralensis Dubois	—
Rana leptodactyla Boulenger	—
Rana limnocharis Wiegmann	Paddy-field Frog
Rana malabarica Tschudi	Fungoid Frog
Rana parambikulamana Rao	—
Rana rufescens (Jerdon)	Rufescent Burrowing Frog
Rana semipalmata Boulenger	—
Rana temporalis (Gunther)	—
Rana tigerina Daudin	Indian Bull Frog

Genus—*Micrixalus* Boulenger, 1888

Micrixalus fuscus (Boulenger)	—
Micrixalus fuscus (Boulenger)	—
Micrixalus nudis Pillai	—
Micrixalus opisthorhodus (Gunther)	—
Micrixalus thampii Pillai	—

Genus—*Nyctibartrachus* Boulenger, 1882

Nyctibatrachus aliciae Inger et. al.
Nyctibatrachus major Boulenger
Nyctibatrachus (minor Ingar et:al)

Genus—*Nannobatrachus* Boulenger, 1882

N. Beddommii Boulenger

Famil—RHACOPHORIDAE

Genus—*Rhacophorus* Kuhl. 1827

Rhacophorus maculatus (Gray)	Chunam Frog
Rhacophorus malabaricus Jerdon	Malabar Tree-Frog

Genus—*Philautus* Gistel, 1848

Philautus beddomii (Gunther)	Beddome's Bush Frog
Philautus chalazodes (Gunther)	—
Philautus charius Rao	—
Philautus femoralis (Gunther)	—
Philautus Glandulosus (Jerdon)	—
Philautus leucorhinus (Martens)	—
Philautus travancorious (Boulenger)	Travancore Bush Frog
Philautus signatus (Boulenger)	—
Philautus temporalis (Gunther)	—
Philautus variabilis (Gunther)	Variable Bush Frog

Family—MICROHYLIDAE

Genus—*Kaloula* Gray, 1831

Kaloulaobscura (Gunther)

Genus—*Melanobatrachus* Beddome, 1878

Melanobatrachus indicus Beddome	Black Microhylid
Microhyle rubra (Jerdon)	Red Microhylid

Genus—*Ramanella* Roa & Ramanna, 1925

Ramanella montana (Jerdon)	Jerdon's Ramanella
Ramanella triangularis (Gunther)	Triangle-Spotted Ramanella.

Genus—*Uperodon* Dumeril & Bibron, 1841

Uperodon systoma (Schneider)	Marbled Baloon Frog

Family—BUFONIDAE

Genus—*Ansonia* Stolizka, 1870

Ansonia rubigina Pillai & Pattabiraman	Torrent Toad

Genus—*Bufo* Laurenti, 1876

Bufo beddomei Gunther	Beddome's Toad
Bufo fergusonii Boulenger	Fergusson's Toad
Bufo microtympanum Boulenger	
Bufo melanostictus Schneider	Common Indian Toad
Bufo parietalis Boulenger	—
Bufo silentvaalleyensis Pillai	

Genus—*Pedostibes* Gunther, 1875

Pedostibes tuberculosus Gunther	Malabar Tree Toad

Order—APODA

Family—CAECILIDAE—*Limbless* amphibians

Genus—Gegeneophis Peters, 1879

Gegeneophis carnosus (Beddome)

Genus—*Ichthyophis* Fitzinger, 1826

Ichthyophis beddomii Peters	—
Ichthyophis malabarensis Taylor	—
Inchthyophis Subterrestris Taylor	
Ichthyophis peninsularis Taylor	—
Ichthyophis tricolor Annandale	—

Genus—*Uraeotyphlus* Peters, 1879

Uraeotyphlus malabaricus (Beddome)	—
Uraeotyphlus menoni Annandale	—
Uraeotyphlus narayani Seshachar	—
Uraeotyphlus Oxyurus (Dumeril & Bibron)	—

NOTES

Amphibians are mainly found in large numbers in the areas with heavy rainfall. In India the Eastern Himalaya and Western Ghats are considered to be the most suitable zones for amphibians. Kerala being a part of the Western Ghats and drenched with heavy rainfall, has become on of the most favourable habitats for two major groups of amphibians. The groups recorded from Kerala State are Anurans (frogs & toads) and Apodans (caecilians). Caecilians are limbless worm-like burrowing amphibians which are noturnal in habit and live in loose moist soil. Kerala is represented by three genera of this group. namely, *Gegeneophis, Ichthyophis* and *Uraeotyphlus*.

A large number of anurans have been recorded from Kerala. Some of these are purely arboreal and the rest are aquatic, semi-aquatic and terrestrial. The arboreal forms are found on the leaves, inside the holes made on tree-trunks, under barks and bushes. The variety which is found inside bushes is commonly known as 'Bush-frog,' the examples of which are *Philautus beddommi, Philautus chalazodes, Philautus variabilis* etc., and those which are living on trees are known as 'Tree-frogs' e. g., *Rhacophorus maculatus* and *Rhacophorus malabaricus*.

Aquatic and semi-aquatic forms are mainly found in Ranid frogs. *Rana cyanophlyctis, Rana hexadactyla* etc., are aquatic and are found in marshy places like ponds, canals and lakes. Frogs like *Rana limnocharis, Rana crassa, Rana keralensis* are considered to be semi-aquatic, as these are found inside bushes and burrows found on the banks of ponds, canals, lakes and demarcation lines of paddy-fields. These frogs jump into water, when disturbed.

Amphibians belonging to the families Microhylidae and Bufonidae are considered to be the purest forms of terrestrial anurans which need to go to water only during breeding season. Most of the microhylid anurans are good burrowers and spend a considerably long period of their life underground, the examples of which are *Uperodon systoma, Kaloula obscura* etc. The toads (*Bufo melanostictus, Bufo fergusonii etc.)* are very rough skinned anurans which possess numerous dermal glands, that possess moisture to keep their skin moist.

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LIST OF THE SPECIES OF REPTILES OCCURRING IN KERALA STATE

A. The following Chelonians are likely to occur in Kerala State

Sl. No.	*Scientific Name*	*Common English Name*	*Ecology*
1.	*Crocodylus palustais Lesson*	The Mugger or Marsh Crocodile	Inhabits rivers, lakes and other large bodies of water in the plains and upto 600 feet in the hills, throughout the Indian Sub continent.
2.	*Crocodylus porosus Schneider*	The Estuarine or Salt Water Crocodile	Inhabits tidal estuaries of the larger continental rivers, marine swamps and coastal brakish water lakes.
3.	*Lepidochelys Olivacea* (Eschscholtz)	Logger head turtle or Pacific Ridley or olive Ridley	It is the commonest sea turtle along the Indian Coasts.
4.	*Heosemys silvatica* (Henderson)	Kerala forest terrapin	Rarely found
5.	*Melanochelys trijuga coronata* (Anderson)	Indian snail-eating Turtle	Generally found in the river systems.
6.	*Geochelone travancorica* (Boulenger)	Travancore tortoise	Its distribution is restricted to the Western ghats of Kerala State.

B. The following Lizards are likely to occur in Kerala State:—

7.	*Cnemaspis beddome* (Theobald)	Dwarf Gecko	The Dwarf Gecko inhabit the forests of Western Ghats.

Sl. No.	Scientific Name	Common English Name	Ecology
8.	*Cnemaspis jerdoni* (Theobald)	Dwarf Gecko	
9.	*Cnemaspis sisparensis* (Theobald)	do.	
10.	*Cnemaspis ornata* (Beddome)	The Dwarf Gecko	It is found under rocks, in dry jungle, very common in the Silent Valley Kerala State.
11.	*Cnemaspis Wynadenis* (Beddome)	The Dwarf Gecko	
12.	*Cyrtodactylus collegalensis* (Beddome)	Collegal Rock Gecko	Mainly a forest species where it is found under stones bark of dead trees.
13.	*Hemidactylus brooki* Gray	Spotted Indian House Gecko	Lives in a variety of habitats, on trees, rocks, understones and on building.
14.	*Hemidactylus frenatus* Schlegel	South Asian waif Gecko	The gecko most often seen in houses.
15.	*Hemidactylus giganteus* Sloliczka	..	..
16.	*Hemidactylus leschenaulti* Dumeril & Bibron	Tamarind tree Gecko	It is found on large trees such as Mango and Banyan.
17.	*Hemidactylus maculatus* Dumeril & Bibron	..	..

Sl. No.	Scientific Name	Common English Name	Ecology
18.	*Hemidactylus reticulatur* (Beddome)	Reticulate Gecko	Found under stones on rocky ground.
19.	*Hemidactylus tricdrus* (Daudin)	House Gecko	Found in house as well as in the jungle.
20.	*Draco dussumieri* (Dumeril & Bibron)	Flying Lizard	Often found in coconut and betel-nut plantations
21.	Calotes calotes (Linns.)	Southern Green Calotes	Commoner in the hills than in the low country found in the hills upto 6,000 feet.
22.	Calotes elliotti Gunther		
23.	*Calotes grandisquams* Gunther	..	..
24.	*Calotes rouxi* (Dumeril & Bibron)	Forest Blood sucker	Its habits are terrestrial and arboreal
25.	Calotes versicolor (Daudin)	Indian garden lizard	Common in gardens, open jungles, found chiefly on bushes and hedges.
26.	*Psammopilus dorsalis* (Gray)	South Indian Rock Lizard.	Common at low elevations
27.	*Salea anamallayana* (Beddome)	..	..
28.	Mabuya beddomii (Jerdon)	Skink	..
29.	*Mabuya macularia* (Blyth)	Bronze grass skink	It is common in forest areas of the peninsula

Sl. No.	Scientific Name	Common Englih Name	Ecology
30.	*Mabuya bibroni* (Gray)	Sand Skink	It is found foraging among the vegetation of the sea shore.
31.	*Mabuya carinata* (Schneider)	Bronze Grass skink	Common in garden and open wooded country.
32.	Riopa punctata (Gmelin)	Dotted garden skink	Common in garden and open wooded country.
33.	Scincella beddomei (Boulenger)	..	..
34.	*Scincella travancoricum* (Beddome)	Travancore Ground Skink	..
35.	*Ristella guentheri* Boulenger	..	..
36.	*Ristella travancorica* Beddome	..	..
37.	*Cabrita leschenaulti* (Milne-Edwards)	..	Found in open jungle country
38.	*Varanus bengalensis* (Daudin)	Common Indian Monitor	Found both in remote forest as well as in the outskirts of villages.

C. The Kerala State is represented by the following species of Snakes: —

39.	*Typhlops beddomei*	Boulenger Beddome's worm snake	..
40.	*Typhlops braminus* (Daudin)	Common Blind snake or Brahminy Blind snake	Found under dead and decaying material.
41.	*Melanophidium punctatum* Beddome	Pied-Belly shield tail	..

Sl. No.	Scientific Name	Common English Name	Ecology
42.	*Paltyplectrurus madurensis* Beddome	Madurai shield tail	..
43.	*Plectrurus perroteti* Dumeril & Bibron	Perrotet's shield tail	..
44.	*Uropetlis beddomei* (Gunther)	Beddome's shield tail	..
45.	*Uropettis ceylanicus* Cuvier	Kerala Shield tail	The commonest species in the Travancore hills
46.	*Uropettis ellioti* (Gray)	Elliots shield tail	..
47.	*Rhinophis travancoricus* Boulenger	Travancore Shield tail	Found at sea level and in the hills to about 4,000 feet altitude.
48.	*Eryx conicus* (Schneider)	Common sand Boa	Found in sandy soil, rat burrow, brick piles and rocky areas
49.	*Ahaetulla perroteti* (Dumeril & Bibron)	Bronze-headed vine snake ..	Common in the Nilgiris at about 5,000 feet altitude.
50.	*Ahaetulla dispar* (Gunther)	Gunther's vine snake	..
51.	*Ahaetulla pulverulentus* (Dumeril & Bibron)	Brown whip snake	Found in the plains and the hills upto 3,000 feet.
52.	*Chrysopelea ornata* (Shaw)	Golden-tree snake	Found in the Jungles near human habitation
53.	*Dendrelaphis granjoculis* (Doulenger)	Large-eyed brown tree snake	..
54.	*Dendrelaphis caudoilneolata*	Stripe-tailed Bronze back tree snake	A rare snake, found only in the hills

Sl. No.	Scientific Name	Common English Name	Ecology
55.	*Dendrelaphis tristis* (Daudin)	Common Indian Bronze back tree snake	Most of which lived in hill forest
56.	*Elaphe helena* (Daudin)	Trinket snake	Found at times of cooler weather on the plains and in the hills.
57.	*Sycodon aulicus* (Linn.)	Common wolf snake	Found within the vicinity of human habitation.
58.	*Lycodon travancoricus* (Beddome)	Travancore wolf snake	..
59.	*Oligodon travancoricus*	Travancore kukri snake	..
60.	*Yonochrophis piscator* (Schneider)	Chequered keel back	Found in ponds canals and water reservoirs etc.
61.	*Amphiesma stolata* (Linnaeus)	Striped keel back	Found in plains and also in the hills.
62.	*Trimeresurus macrolepis* Beddome	Large-scaled green pit viper	Arboreal and terrestrial
63.	*Trimeresurus malabaricus* Jerdon	Malabar rock pit viper	A common snake of hills.
64.	*Trimeresurus strigatus* Grey	Horse-shoe pit viper	Found in between 3,000 and 6,000 feet altitude.
56.	*Enhydrina schistosa* (Daudin)	Hook-nosed sea snake	Found in sea
66.	*Lapemis curtus* (Shaw)	Malabar sea snake	do.
67.	*Pelamis platurus* (Linn.)	Yellow and black sea snake	Found only in purely salt water and does not frequent the mouth of rivers.

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LIST OF BIRDS IN KERALA STATE

Family—Podicipedidae

Podiceps ruficollis capensis Salvador—Little Grebe

Family—Pebcanidae

Pelecanus p. philippensis Gmelin—Spotted billed pelican

Family—Sulidae

Sula dactylatra melanops Henglin—Masked Booby

Family—Phalaerocoracidae

Phalacrocorax carbo sinensis (Shaw)—Large cormorant

Phalacrocorax fuscioollis Stephens—Indian Shag

Phalacrocorax niger (Vicillot)—Little Cormorant

Anhinga rufa melanogaster Pennant—Snake Bird

Family—Ardeidae

Ardea cinerea rectirostris Gould—Grey Heron

Ardea purpurea manilensis Meyen—Purple Heron

Butorides striatus chloriceps (Bonaparte)—Little Green Heron

Ardeola grayii grayii (Sykes)—Pond Heron

Bubulcus ibis coromandus (Boddaert) Cattle Egret

Egretta alba modesta (J. E. Gray)—Large Egret

Egretta i. intermedia (Wagler))—Smaller Egret

Egretta garzetta garzetta (Linnaeus)—Little Egret

Egretta gularis schistacea (Hemprich and Ehrenberg)—Indian Reef Heron

Nycticorax n. nycticorax (Linnaeus)—Night Heron

Gorsaehius m. melanolophus (Raffles)—Tiger Bittern

Ixobrychus sinensis (Gmelin)—Yellow Bittern

Dxobrychus cinnamomeus (Gmelin)—Chestnut Bittern

Dupetor flavicollis flavicollis (Latham)—Black Bittern

Family—Ciconiidae

Ibis lencocephalus (Pennant)—Painted stork

Arastomas ascitans (Boddaert)—Openbill stork

Leptoptilos javanicus (Horsfield) Lesser Adjutant stork

Family—Threskiornithidae

Threskiornis melanocephalus (Latham)—White Ibis

Psedifis papillosa (Temminck)—Black Ibis

Platalea leucorodia major Temmenck and Schlegal—Spoonbill

Family—Anatidae

Dendrocygna javanica (Horsfield)—Lesser Whistling Teal

Anas acuta Linnaeus—Pintail

Anas crecca crecca Linnaeus—Common Teal

Anas strepera strepera Linnaeus—Gadwall

Anas penolopa Linnaeus—Wigeon

Anas querquedula Linnaeus—Gargany

Anas clypeata Linnaeus—Shoveller

Netta rufina (Pallas)—Redcrested Pochard

Aytha ferina (Linnaeus)—Common Pochard

Aythya nyroca (Guldenstadt)—White-eyed Pochard

Aythya fuligula (Linnaeus)—Tufted Duck

Family—Accipitridae

Elanus caeruleus vociferus (Latham)—Blackwinged Kite

Aviceda jiedoni ceylonensis (Legge)—Legge's Baza

Aviceda leuphotes leuphotes (Dumont)—Lizard Hawk

Pernis ptilorhyncus ruficollis Lesson—Honey Buzzard

Milvus migrans govinda Sykes—Pariah Kite

Haliaster indus indus (Boddaert)—Brahminy Kite

Accipiter badius badius (Gmelin)—Ceylon Shikra

Accipiter trivirgatus peninsulae Koelz—Crested Goshawk

Accipiter nisus nisosimilis (Tickell)—Asiatic sparrow Hawk

Accipiter virgutus besra (Jerdon)—Southern Besra sparrow—Hawk

Butaster teasa (Franklin)—White-eyed Buzzard—Eagle

Spigaetus nipalensis kelaarti Legge—Legge's Hawk—Eagle

Spizaetus cirrhatus cirrhatus (Gmelin) Indian Crested—Hawk Eagle

Hieraeatus pennatus (Gmelin)—Booted Hawk Eagle

Jethyophaga i iethyaetus (Horsfield)—Greyheaded Fishing Eagle

Trogos calvus (Scopoli)—King vulture

Cyps indicus indicus (Scopoli) Indian Long-tailed vulture

Neophron percnopterus ginginianus (Latham)—Scavenger vulture

Circus melanoleucos (Pennant)—Pied Harrier

Spilornis cheela melanotis (Jerdon)—Peninsular crested serpent eagle

Family—Falconidac

Falco peregrinus peregrinator Sundevall—Shaheen Falcon

Falco tinnunculus objurgatus (Baker)—Kestrel

Family—Phasiaridae

Coturnix coturnix coturnix (Linnaeus)—Grey Quail

Perdicula asiatica vidali Whistler and Kinnear—Jungle Bush Quail

Perdicula e. erythrorhyncha (Sykes)—Painted Bush Quail

Galloperdix lunulata (Valeneienes)—Painted spurfowl

Gallus sonneratii Temminck—Grey Junglefowl

Family—Furnicidae

Turnix suscitator taigoor (Sykes)—Indian Bustard-quail

Family—Rallidae

Amanornis p. phoenicurus (Pennant)—Ceylonose White-breasted waterhen

Porphyrio porphyrio poliocephalus (Latham)—Indian Purple Moorhen

Fulica atra atra Linnaeus—Coot

Family—Jacanidae

Metopidius indicus (Latham)—Bronz winged Jacana

Family—Charadriidae

Vanellus indicus indicus (Boddaert)—Redwattled Lapwing

Vanellus malabaricus (Boddaert)—Yellow-wattled Lapwing

Charadrius a. alexandrinus Linnaeus—Keatish Plover

Charadrius mongolus atrifrons Wagler—Pamir Lesser sand Plover

Limosa limosa limosa (Linnaeus)—Blacktailed Godwit

Tringa totanus eurhinus (Oberholser)—Blacktailed Redshank

Tringna stagnateles (Beckstein)—Little Greenshank

Tringa nabularia (Cunnerus)—Greenshank

Tringa ochropus Linnaeus—Green Sandpiper

Tringa glareola Linnaeus—Wood Sandpiper

Tringa terek (Latham)—Terek Sandpiper

Tringa hypolencos Linnaeus—Common Sandpiper

Gallinago stenura (Bonaparte)—Pintail Snipe

Gallinago gallinago (Linnaeus) Common Snipe

Calidris minutus (Leisler)—Little stint

Rostratula b. benghalensis (Linnaeus)—Painted snipe

Humantopus h. humantopus (Linnaeus)—Black-winged stilt

Family—Burhinidae

Burhinus oedionemus indicus (Saivadori)—Indian stone Curlew

Family—Glareolidae

Glareola lactea Temminck—Small Indian Pratincola

Family—Laridae

Larus fuscus fuscus Linnaeus—Lesser Black backed Gull

Larus brunnicephalus Jerdon—Brownheaded Gull

Chlidonias hybrida indica (Stephens)—Indian whiskered Tern

Sterna auranta J. E. Gray—Indian River Tern

Sterna acuticauda J. E. Gray—Blackbellied Tern

Family—Columbidae

Treron pompadora affinis (Jerdon)—Grey fronted Green Pigeon

Treron phoenicoptera chlorigaster (Blyth)—Southern Green Pigeon

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Ducula badia cuprea (Jerdon)—Southern Maroon backed Imperial Pigeon

Columba livia intermedia Strickland—Indian Blue Rock Pigeon

Columba elphinstonii (Sykes)—Nilgiri Wood Pigeon

Streptopelia decaocto decaocto (Frivalolszky)—Indian Ring Dove

Streptopelia t. tranquebarica (Hermann)—Indian Red Turtle Dove

Chalcophaps Indica indica (Linnaeus) Indian Emerald Dove

Family—Psittacidae

Psittacula eupatria nipalensis *(Hodgson)*—Large Indian Parakeet

Psittacula kramari manillensis (Bechstani) Roser-winged Parakeet

Psittacula C. cyanocephala (Linnaeus)—Southern Bloossom headed Parakeet

Family—Cuculidae

Clamator coromandus (Linnaeus)—Redwinged crested Cuckoo

Clamator jacobinus jacobinus (Boddaert)—Ceylon Pied Crested Cuckoo

Cuculus varius varius—Vahl—Common Hawk-Cuckoo Gould

Cuculus micropterus micropterus—Indian Cuckco

Cacomantis sonneratii sonneratii (Latham)—Indian Baybanded Cuckoo

Cacomantis merulinus passerinus (Vahl)—Indian Plaintive Cuckoo

Eudynamys scolopacea scolopacea (Linnaeus)—Indian Koel

Centropus sinensis parroti Stressemann—Southern Crow—Pheasant

Centropus toulou bengalensis (Gmelin)—Lesser Coucal

Family—Strigidae

Tyto alba stertens Hartert—Indian Barn Owl

Otus bakkamoena bakkamoena Pennant—Ceylon collard Scops owl

Otus scops rufipennis (Sharpe)—Peninsular scops Owl

Bubo bufo bengalensis (Franklin)—Indian Great Horned Owl

Bubo Zeylonensis leschenadthi (Temminck)—Brown Fish Owl

Glaucidium radiatum malabaricum (Blyth)—Malabar Barred Jungle Owlet

Ninox scutulata hirsuta (Temminck)—South Indian Brown Hawk—Owl

Athene brama brama (Temminck)—Southern spotted Owlet

Family—Caprimulgidae

Caprimulgus indicus indicus Latham—Indian Jungle Nightjar

Caprimulgus macrurus atripennis—Jerdon—Scuthern longtailed Nightjar

Caprimulgus asiaticus asiaticus Latham—Indian Little Nightjar

Family—Apodidae

Collocalia unicolor (Jerdon)—Indian Edible-nest Swiftlet

Chaetura sylvalica (Tickell)—White rumped spine tail swift

Apus melba nubifuga Koelz—Indian Alpine Swift

Family—Trogonidae

Harpectes fasciatus malabaricus (Gould)—Malabar Trogon

Family—Alcedinidae

Alcedo atthis taprobana Kleinschmidt—Ceylon small Blue Kingfisher

Ceyx erithacus erithacus (Linnaeus)—Threetoed Forest Kingfisher

Pelargopsis capensis capensis (Linnaeus)—Brown-headed Stork billed Kingfisher

Heleyon smyrnewsis fusca (Boddaert) Indian white-breasted Kingfisher

Family—Meropidae

Merops leschenanlti leschenaulti vieillot—Chestnut—headed Bee-eater

Merops orientalis orientalis Latham—Small Green Bee-eater

Family—Coraciidae

Coracias benghalensis indica Linnaeus—Southern Roller

Eurystomus orientalis laetior Sharpe—Kerala Broad billed Roller

Family—Upupidae

Upupa epops ceylonensis Reichenback—Ceylon Hoopoe

Family—Bucerotidae

Tockus birostris (Scopoli)—Grey Hornbill

Anthracoceros coronatus coronatus (Bod:daert)—Malabar Pied Hornbill

Buceros bicornis homrai Hodgson—Great Pied Hornbill

Family—Capitonidae

Megalaima zeylanica zeylanica (Gmelin)—Ceylon Green Barbet

Megalaima viridis (Bodaert)—Small Green Barbet

Megalaima heamacephala indica (Latham)—Coppersmith

Family—Picidae

Picumnus innominatus malayorum Hartert—Southern Speckled Piculet

Micropternus brachyurus jerdonii (Malharbe)—Southern Rufus Woodpecker

Picus chlorolophus chlorigaster Jerdon—South Indian small yellow naped woodpecker

Dinopium finghalense tehminae (Whistler' Kinnear)—Kerala golden backed Woodpecker

Picoides mahrattensis mahrattensis (Latham)—Yellow-fronted pied Woodpecker

Pocoides nanus cinereigula (Malharbe)—Kerala Browncrowned pigmy Woodpecker

Chrysocolaptes lucidus chersonesus Kloss—Southern Larger Golden backed Woodpecker

Family—Pittidae

Pitta brachyura brachyura (Linnaeus)—Indian Pitta

Family—Alandidae

Mirafra assamica affinis Blyth—Madras Bush lark

Ermopterix grisea (Scopoli)—Ashycrowned Finch lark

Clandrella cinerea dukhunensis (Sykes)—Rufous short toed lark

Garerida malabarica (Scopoli) Malabar Crested lark

Alauda gulagula australis Brooks—Nilgiri Small Sky-lark

Family—Hirundinidae

Hirundo rustica gutheralis Scopoli—Eastern Swallow

Hirundo smithi filifera Stephens—Indian Weretailed Swallow

Hirundo dauriea japonica Temminck Schleged—Re-drumped Swallow

Delidon urbica urbica (Linnaeus)—European House Marten

Family—Lanidae

Lanius viltatus. viltatus Vallenciennes—Indian Bay-backed

Lanius schach caniceps Blyth—South Indian Grey-backed Shrike

Laniks cristatus cristatus Linnaeus—Brown Shrike

Family—Oriolidae

Oriolus oriolus kundoo Sykes—Golden oriole

Oriolus xanthornus maderaspatanus Franklin—South India Blackheaded oriole

Family—Dicruridae

Dicrurus adsimilis macrocerus Viellot—Southern Black Drongo

Dicrurus aeneus Viélliot—Bronzed Drongo

Dicrurus hhottentothes (Linnaeus)—Spangled Drongo

Dicrurus p. paradiseus (Linnaeus)—Southern Large Racket tailed Drongo.

Family—Atramidae

Atramus fuscus Viellot—Ashy Swallow—Shrike

Family—Sturnidae

Sturnus malabaricus blythii (Jerdon)—Greyheaded Myna

Acridotheres tristis tristis (Linnaeus)—Indian Myna

Gracula religiosa indica (Cuvier)—Southern Hill Myna

Dendrocitta vagabunda parvula Whistler Kinnear—Kerala Tree-pie

Family—Corvidae

Corvus splendens

Corvus macrorhynchos culminatus Sykes—Indian Jungle crow

Family—Campephagidae

Hemipus picatus picatus (Sykes)—Blackbacked pied Flycatcher shrike

Tephro dornis gularis sylvicola Jerdon—Malabar wood shrike

Tephrodornis p. pondicerianus (Gmelin)—Indian wood shrike

Coracina novaehollandiae macei (Lesson)—Large cuckoo-shrike

Coracina melanoptera sykesi (Strickland)—Peninsular Blackheaded cuckoo-shrike

Pericrocotus flammeus flammeus (Forster)—South Indian Scarlet Minivet

Pericrocotus cinnamomeus malabaricus (Gmelin)—Southern small Minlket

Family—Irenidae

Aegithina tiphia deignani Hall—South Indian Iora

Chloropsis aurifrons frontalis (Pelzala)—Southern Gold fronted chloropsis

Irena puella puella (Latham)—Fairy Bluebud

Family—Pycnonotidae

Pycnonotus cafer cafer (Linnaeus)—Redvented Bulbul

Hypsipetes madagascariensis ganeesa Vigors—South Indian Black Bulbul

Family—Muscicapidae

Pellorneum ruficeps ruficeps Swainson—Peninsular spotted Babbler

Pomatorhinus schisticeps Harington Kerala Seimiter Babbler

Garrulex delesserte delesserte (Jerdon) Wynad Laughing Thrush

Alcappe poeoicephala poeoicephala (Jerdon) Nilgiri Quaker Babbler

Museicapa pallipes Jerdon—White bellied Blue Flycatcher

Museicapa tickelliae tickelliae (Blyth)—Tickell's Red breasted Blue Flycatcher

Museicapa thalassina thalassina Swainson—Verditer Flycatcher

Rhipidura aureda compressirostris (Blyth)—Southern Whitebrowed Fantail Flycatcher

Rhipidura albicollis albogularis (Lesson)—White spotted Fantail Flycatcher

Terpsiphone paradisi paradisi (Linnaeus)—Peninsular Indian paradise flycatcher

Monarcha azurea styani (Hartlaub)—Indian Black-naped Monarch Flycatcher

Cisticola exilis erythrocephala (Blyth)—Redheaded Fantail Warbler

Cisticola juncidis salimalis Whistler—Kerala streaked Fantail Warblor

Cisticola juncidis salimalis Whistler—Kerala streaked Fantail Warbler

Prinia bodgsoni albogularis Walden—Southern Ashy—Grey Wren—Warbler

Prinia subflava franklinii Blyth—Nilgiri Plain Wren—Warbler

Prinia socialis socialis Sykes—Southern Ashy Wren—Warbler

Prinia sylvatica sylvatica Jerdon—peninsular Jungle Wren—Warbler

Orthotomus sutorius guzuratus (Latham)—Indian taillor Bird

Phylloscopus aceipitalis aceipitalis (Blyth) Large crowned leaf Warbler

Copsychus malabaricus malabaricus (Scopoli) Malabar Shama

Saxicola targuata indica (*Blyth*)—Indian coloured Bush Chat

Saxicoloides fulicata fulicata (Linnaeus) Black backed Indian Robin

Monticola solitarius pandoo (Sykes)—Indian Blue Robin Thrush

Myiophonus horsfieldii (Vigors)—Malabar Whistling Thrush

Zoothera citrina cyanotus (Jardine and Selby)—White-throated Mountain Thrush

Zoothera dauma nelgherriensis (Blyth)—Nilgiri Thrush

Turodus merula nigropilens (Lafresnaye)—Black capped blackbird

Family—Paridae

Parus major mahratharum Hartert—Ceylon Grey Tit

Parus rubidiventris rufonuchalis Blyth—Simla Black Tit

Parus dichrous kangrae (Whistler)—Western Brown Crested Tit

Parus xanthogenys aplonotus Blyth—Central Indian Yellow checked Tit

Family—Sittidae

Sitta castanea castanea Lesson Peninsular chestnut Bellied

Sitta frontalis Swainson Velvetfronted Nuthatch

Family—Motacillidae

Anthus hodgsoni hodgsoni (Richmond) Indian Tree Pipit

Anthus trivialis trivialis (Linnaeus)—European Tree Pipit

Anthus novaesseelandiae malayensis Eyton—Malay Paddy field Pipit

Motacilla indica Gmelin—Forest Wagtail

Motacilla flava simillima Hartert—Short—Tailed Grey headed Yellow Wag tail

Motacilla caspica caspica (Gmelin) Gray Wagtail

Motacilla maderaspatensis Gmelin—Large pied Wagtail

Family—Dicacidae

Dicaeum agile agile (Tickell)—Indian thickbilled Flowerpecker

Dicaeum erythrorhynchos erythrorhynchos (Latham) Tickells Flowerpecker

Dicaeum concolor concolor Jerdon—Nilgiri Flowerpecker

Family—Nectarinidae

Nectarinia zeylonica sola (Viellot)—Indian purple rumped sunbird

Nectarinia minima (Sykes)—Small sunbird

Nectarinia lotenia hindustanic (Whistler)—Indian Maroonbreasted sunbird

Nectarinia asiatica asiatica (Latham)—Indian purple sunbird

Arachnothera longirostrio longirostrio (Latham)—Little spider hunter

Family—Ploceidae

Passer domesticus indicus Jardine and Selby—Indian House sparrow

Plocens manyar flaviceps Lesson—Indian Streaked Weaver Bird

Lonchura malabarica malabarica (Linnaeus)-White throated munia

Lonchura Kelaarti Jerdon (Hume)

Jerdon Rufus Bellied Munia

Lonchura punctulate (Linnaeus)—Indian spotted Munia

SPECIES/GENERA OF VARIOUS FAUNAL GROUPS IN KERALA

Faunal Group	*Indian Species/Genara*		*Kerala Species/Genera*	
(1)	(2)	(3)	(4)	(5)
Mammalia	500	135	109	65
Aves	1200	394	386	108
Reptilia:—				
Snakes	189	58	99	41
Lizards	132	42	59	21
Testudines	37	15	11	8
Fishes (Inland)	581	200	95	46
Amphibia	111	24	20	55

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(1)	(2)	(3)	(4)	(5)
Lepidoptera—				
Butterflies	791	209	300	131
Moths	..	747	..	363
Odonata	350	80	94	45
Hymenoptera	1066	248	54	32
Orthoptera	306	146	65	46
Dermaptera	56	19	2	2
Diptera	598	190	93	48
Arachnida:—				
Scorpions	99	18	14	7
Spiders	297	55	17	10
Hirudinea	23	12	9	4
Polychaeta	..	55	..	9
Mollusca (Gastropoda)	..	98	..	42
Platyhelminthes	213	71	4	4
Porifera	11	4	2	1
Protozoa, ciliates	310	105	46	..
Sporozoa	287	66	96	..
Freshwater plankton:—				
Cladocera	89	33	11	8
Rotifera	..	11	..	4

(f) State Assistance to Agriculture and connected subjects:

State assistance to agriculture and connected subjects is chiefly through the medium of co-operative societies. The societies comprise of two wings. One catering to short and medium term credit and the other disbursing long term agricultural loans. The Kerala State Co-operative Bank is the apex institution in the co-operative credit sector with 14 District Co-operative Banks at the district level and 1574 Primary Agricultural Credit Societies at the primary level providing short and medium term loans for agricultural purposes.

During the 25 year period from 1956-57 to 1980-81 the share capital of the Kerala State Co-operative Bank has increased by 30 times, reserves by 400 times, deposits by 134 times, borrowings by 66 times and working capital by 103 times and loans advanced by 187 times. Under the schematic lending programmes the Bank undertakes financing of schemes for development of agriculture and allied activities such as dairying, goat rearing, poultry keeping, installation of bio-gas plants etc., with financial assistance from NABARD. The District Co-operative Banks being the pivotal agencies for promotion and development of co-operatives have acquired satisfactory standards of growth financially and managerially. The flow of credit and its servicing as well as the strength of the co-operative credit structure depend upon the strength of the primary agricultural credit societies which cover the entire area of the State. These societies perform a variety of services apart from dispensing credit like distribution of fertilizers, pesticides, seeds, agricultural machinery and essential consumer articles and also loans for construction of houses for weaker section. Co-operatives account for nearly half of the total fertilizer distribution in the State. An intensive drive for improving further the performance of the societies has been undertaken under the Prime Minister's new 20 Point Programme. This involves simplification of loaning procedure, intensive collection drive, incentive for prompt repayment and augmentation of own resources. Intensive deposit mobilisation campaigns are launched every year which rope in sizable amounts by way of deposits. Efforts are also being made to increase the membership of Scheduled Castes and Scheduled Tribes in primary societies, in order to enable them to derive a large share of the benefits. Towards this end in view, a scheme for grants to the Scheduled Castes and Tribes to the extent of 90% of the share value to enable them to enrol themselves in the co-operatives, has been launched.

The Kerala Co-operative Central Land Mortgage Bank (established in 1956) with Headquarters at Trivandrum is the apex institution responsible for dispensation of long term agricultural

credit through 33 Primary Land Mortgage Banks. The emphasis in the loaning portfolio of these institutions is on schematic lending rather than sporadic lending.

The Bank advances loans under the normal programme as well as under NABARD (National Bank for Agriculture & Rural Development) schemes for various agricultural development purposes like development of Minor Irrigation facilities (construction/renovation of wells/tanks etc., and installation of pumpsets, pipelines etc.) Land Development including Soil Conservation measures and Land reclamation, cultivation of Horticultural, Plantation and Spices crops like Pineapple, Rubber, Coffee, Cashew, Coconut, Arecanut, Pepper, Cardamom, Cloves, Nutmeg, Betelvine, Tea, Cocoa, etc., Financing is also done for allied activities like Dairying, Goat rearing, Fisheries, Poultry, Farm mechanisation, Bio-gas etc.

NABARD Schemes:

The Bank has at present 225 on-going schemes (as on 1-7-1984) with financial outlay of Rs. 60.05 crores. 113 schemes are in different stages of processing with a financial outlay of Rs. 35.27 crores. In addition to this, the Land Mortgage Bank is responsible for the disbursement of 50% of long term credit envisaged in SADU Schemes under the World Bank assisted Kerala Agricultural Development Project. The total programme proposed to be financed during 1984-85 is Rs. 31.00 crores.

The rate of interest payable by the loanee farmers are:

Small Farmers:	10% per annum for all purposes.
Other Farmers:	10% per annum for Minor Irrigation and Land Development Works. 12.5% for other purposes.

The Government of Kerala has sanctioned an interest subsidy of 5% on all loans provided the repayment is made promptly on the due date stipulated.

The Bank has got a Staff Training Centre assisted by the National Bank for Agriculture and Rural Development (NABARD) to train the different categories of employees and also non-official Directors of the Primary Land Mortgage Banks.

(g) Floods, Famines and Drought:

Heavy rainfall, copious mountain catchments and 44 rivers, big and small spanning the state, frequently result in flood damage. The tragic course of the rapid torrents erodes the soils, floods the lands on the flanks washing themselves waste into the sea without proper exploitation. A large part of the habitable lands lie between +3.0 and +6.0, a little above high tide level. In the monsoon they often get flooded by a 30 to 60 centimetres, for one or two weeks. Any rise beyond this will cause inconvenience and discomfort to habitation and damage to crops. There are other areas of isolated blocks where river-spills in high floods cause damage to life and property.

Allied to flood damage, is beach erosion. Indeed beach erosion is creating more damages, posting great dangers in Kerala and assuming menacing proportions. Population pressure is heaviest along the coast, so when the shore line is eroded and a portion of the land is swallowed up by the sea, residential buildings or huts and costly gardens disappear bringing in its wake untold miseries to thousands of people. They also endanger the safety of national assets like roads, railway line and canals. These dangers and damages are further aggravated by tidal overflows in the monsoons.

History of floods:

The memory of the year 1924 lingers in the minds of the aged of Kerala. The year witnessed unprecedented and severe floods in almost all the rivers of the State. Heavy losses of life, property and crop occurred. Although the 1924 flood levels have not been surpassed in most of the rivers, 1961 also witnessed heavy floods. Normally heavy precipitation is concentrated over a period of 7 to 10 days during the monsoon when the rivers overtop their banks and inundate the adjacent low lying areas. But in 1961, floods were abnormally intense not only in duration, but in precipitation. Towards the last week of June 1961, the monsoon commenced in full fury in the southern region of Kerala and swept through the entire state within a week. The Periyar basin was the worst affected. Several vital communication links snapped. The average rainfall was 56% above normal. The maximum daily intensities recorded at four district zones were:

Calicut	234 mm.
Trivandrum	136 mm.
Cochin	189 mm.
Palghat	109 mm.

115 people lost their lives due to floods and land slides. Over 50,000 houses were completely or partly damaged and about 47,000 acres of paddy were seriously affected.

In the background of the havoc caused by the 1961 floods, the State Government decided to study the problem of floods in the entire State. All available data were collected. A long range outline plan for the flood control in Kerala was drawn up. Several measures like construction of storage reservoirs, flood levels, removal of obstruction to the natural outflow in river mouths, desilting of water courses including widening or straightening. Constructing long groynes to avert bank erosion have been suggested for achieving flood moderation.

The heavy rainfall in 1968-69 estimated at 3,250 mm. as against 2,746 mm in 1967-68, was occassioned by the very heavy downpour from south west monsoon in July 1968, which resulted in one of the worst floods of recent years causing considerable damage to crop and property. Severe floods next occurred in November 1978, causing wide spread damage to life and property in various parts of the State.

The state was once again ravaged by severe floods, land slides and sea erosion in 1985, resulting in heavy loss of life and property. The entire economy of the State has been disrupted on account of severe loss to agriculture and fisheries which is the mainstay of the State. 102 persons lost their lives and nearly 7,500 persons were injured. 146 lakhs (i.e. 52% of the total population were affected Details of the damages and the cost of relief is given in the table.

Assessment of loss/damage to people, private and public assets and cost of relief

1.	Total number of deaths:	102
2.	Total number injured:	7,400
3.	Total number of houses damaged:	4.78 lakhs
4.	Total population affected:	146 lakhs (i.e. 52% of the total population)
5.	Cropped area affected:	145, 761 hectares

6.	Crops affected:	Paddy, banana, coconut, arecanut, tapioca, ginger, pepper, cardamom, rubber etc.
7.	Estimated loss:	Rs. 161.5 crores
8.	Loss of cattle (Nos.)	190,002
9.	Loss of poultry (Nos.)	153,800
10.	Loss of agricultural implements, bund collapse, soil conservation works etc.	Rs. 2 crores
11.	Estimated damages in the fisheries sector:	Loss of traditional craft nets, stake-nets, loss of prawn and fresh water fish culture, fish seedlings etc.
12.	Loss of coir products:	Rs. 10 crores worth of husk washed off.
13.	Damage to P.W.D. Roads:	7,337 kms. of roads, bridges and culverts.
14.	Relief required:	Rs. 743 crores

Famines:

The State has been relatively free from famine. It is true that Kerala State does not grow sufficient foodgrain for its own consumption, and has to make up the deficiency by import. "Real famine is unknown in the land.................famine due to widespread failure of crops there is little or no record" (Innes-Malabar District Gazetteer, Vol. I,pp. 281-82). However it would be interesting to note that severe famine which raged throughout the Madras Presidency in 1865 and 1866 made its effects felt in Malabar. A daily average of 6,353 people were relieved during the five months from July to November 1866, of whom 6,198 were relieved gratuitously and 155 employed on wages. The maximum number relieved in any one month was 24,206 in August 1866. An unprecedented outbreak of dacoity and violent crime was a marked feature of these two years.

Again from 1876 to 1978, the terrible years in which the whole of South India was stricken with famine, Malabar suffered in common with the rest of South India during the critical period but only to a lesser degree. The North East Monsoon of 1876 failed with the result that the Makaram crops on the plains perished and the coffee crop in Wayanad was damaged. As no grain was available for import from the famine stricken areas of Mysore and the districts of the Madras Presidency, famine threatened Malabar in general, and the Wayanad area in particular. 30,000 workers flocked every year from Mysore into Wayanad for the picking of coffee, but with the coffee all picked by the end of December 1876, "the authorities were confronted with the prospect of having thousands of destitute coolies thrown on their hands with no money saved and no inducement to return to Mysore, where famine was worse". A sum of Rs. 5,000 was therefore spent in Wayanad for relief early in 1877 and the Mysore Government deported the workers to their homes. But real distress was experienced only in the monsoon months of the year when relief camps were opened in the region. The average number relieved daily in Vayittiri during the months of June to October came to 55, 98, 71, 60 and 72 respectively. At the end of 1890, there was a very general failure of Makaram rice crop in Tirur taluk and of the coffee crop in Wayanad. The collection of arrears of kist was postponed till the following October. After this period, no famine of conspicuous dimension has occurred though there have been instances of partial crop failure and consequent dearth of food grains. During the Second World War, the State experienced a period of acute food scarcity, when the principal rice supplying areas in Burma and Thailand became theatres of war, thus disrupting traditional sources of supply. Widespread rationing had to be introduced with a view to alleviating the people's distress. At present the entire state is covered by a network of public distribution system catering to essential food requirements of the public. A wide variety of consumer goods like foodgrains, sugar, edible oil and Kerosene are distributed at fair price to ration card holders in the State.

Droughts:

A detailed account of droughts is given in climatological summary of Vol. I and the interested reader may kindly refer the relevant portions. Generally, the State, by virtue of its copious rainfall is least prone to drought. This however does not imply that there have been crop failures. Lack of adequate rainfall i.e. well below the normal, have been responsible for crop failure particularly paddy. Unusual drought conditions prevailed in November 1961. When the full force of the north-east monsoon failed to make any impact. The

usual amount of precipitation in normal years during November is about 37 to 40 cms. In that year it was so low as 7.75 cm. This did affect the second paddy crop which otherwise would have been a bumper on this year. The lack of rain in that season had its repercussion on coconut and other crops as well. 1965-66 was one such year when the annual rainfall was lowest at 2,209 millimetres as against 3,734 mm. in 1960-61. Food grains production was worst affected. Rice production was only 9.97 lakh tonnes in 1965-66 as against 11.21 lakh tonnes in 1964-65 registering a 11% fall.

A severe drought in 1982-83 caused a shortfall in revenue receipts. Production of electricity went down leading to a stoppage of inter State sale of power resulting in a shortfall of Rs. 35 crores in the State's income. The industrial recession following the power cut adversely affected the market situation and consequently the sales tax income. Not only standing crops, but also planting of new crops was affected. Consequently there was a general fall in the area and production under almost all crops. The year 1982-83, witnessed quite a subdued activity from both South West and North East monsoons. Compared to the normal rainfall, the year (July to June) received less than 47% of the annual rainfall.

Compensation for flood hit farmers

Higher rates of compensation have been sanctioned by the Government for agriculturists and farm workers who suffered losses following natural calamities. The orders issued earlier have been modified accordingly.

All farmers owning up two hectares of land will be eligible for the compensation, irrespective of the income they earn. In the case of those owning more than two hectares, it will be available only if their income is less than Rs. 10,000. The compensation will also be limited to two hectares in their possession.

In the case of single crop land, the rates will be fixed on the basis of the income obtained from the land just prior to the period of the calamity.

For every uprooted coconut tree if it yielded more than 50 nuts a year, Rs. 125 per tree, will be given as against Rs. 100 previously. Fruit-bearing banana and plantain trees will be paid Rs. 12.50 each (Rs. 10 earlier) and for a fully grown plantain, Rs. 7.50 (Rs. 5).

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The compensation for rubber trees will be Rs. 40 per tree, (Rs. 25). The rates for lemon grass cultivation will be Rs. 500 per hectare (Rs. 250) and groundnut Rs. 405 (Rs. 200) per hectare.

For pepper vines, it will be at the rate of Rs. 7 each as against only 30 paise earlier.

Sea Erosion:

A coast can be considered stable if the supply and erosion of sand in a year are equal. If the supply is more, the result is accretion and if erosion is more it results in continuous loss of land. Accretion is undesirable in ports and harbours as it hinders navigation.

India's coastline is one of the longest in the world extending a little over 5,700 km. Erosion of the coast-line occurs in patches in the States of Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu and West Bengal. But the problem is of serious magnitude along the Kerala coastline.

Kerala with an area of 38,863 sq. km. has a coastline of about 590 km. Of this, about 320 km. is subject to erosion especially during the monsoon. Annually about two to five metres width of land is lost on an average. In one place near Cochin, about two km. width of land has been eroded since 1850.

Besides permanent loss of valuable land, erosion also poses a threat to the communication system. The national highway and the railway line are quite vulnerable at some points along the coast. Further, several important towns including the headquarters of nine districts are situated in this area. The coastal region is the most thickly populated area in this over-populated State.

Though the length of Kerala's coast forms only about 10 per cent of India's coastline it contributes to about 40 per cent of fishery products exported from India. An estimated 1.25 lakh people are directly engaged in fishing besides a large number dependant on this industry in processing, transporting and marketing. It is in this context that the matter has to be viewed, and measures taken to protect the territory at any cost.

The stability of a beach is maintained by several known and unknown forces acting on the coast. Among them are the variations in water level at the coast, the variations in internal energy due to disturbances like waves and ocean currents. These dynamic forces produce disturbance and dislocation of the fine coast material

causing littoral drift. The cumulative effect of such persistent action of the sea causes erosion of the coast, often to a considerable extent resulting in extensive loss of land.

As the rivers in Kerala are small, the quantity of sediments trapped by the reservoirs is comparatively insignificant. Still the construction of several reservoirs and also the removal of sand from the river bed and even from coast for various purposes might have reduced the quantity of annual supply of sand to the coast. This may be one of the reasons for the continuous erosion of the coast.

By far the major portion of the waves which attack shore and harbour areas are those generated by wind. As the waves approach the shore their energy must be reflected or dissipated or the resultant powerful forces may have an adverse effect on the coast. Waves may also be generated by sudden change in barometric pressure over a limited area of water surface or by underwater seismic or volcanic disturbances.

During the South West Monsoon from June to September waves measuring about four metres in height pound the coast from the south-west direction and erosion is very severe during this time.

Mud bank is a phenomenon peculiar to the coast of Kerala. A similar phenomenon has not been reported in any other part of the world. These are in-shore regions of thick colloidal suspensions sometimes about 10 km. long and about 8 km. wide and parallel to the coastline, their peculiar property being complete damping of wave action even during the roughest monsoon. It disrupts the normal wave action and material energy balance, causes wave defraction and refraction, arrests littoral drift, causing accretion behind it and consequent severe erosion on the adjacent coastline especially on its down drift side. The mud banks move from place to place erratically causing complete chaos in material energy balance and coastal equilibrium processes.

Coastal protection work in Kerala was undertaken as early as in 1800. So far 90 km. of the coast has been protected. The approximate cost of constructing one kilometre length of standard protection structure comes to about Rs. 30 lakhs. Thus the cost of protecting the remaining length of the eroding coastline will be over Rs. 40 crores. Protection measures consisting mainly of sea walls and rivetments are most suitable to Kerala. Where severe erosion threatens high value locations, offshore breakwaters parallel to the coast may be used to prevent the erosion and build beach. The presence of breakwaters not only prevents the waves from reaching the shore but also create a quiet area in which littoral drift is deposited. In most cases the best solution can be obtained by elaborate model studies.

APPENDIX

Major and Medium Irrigation Projects—Achievements during 1983-84

Name of the Project	Cultivable Command Area (In Ha.) Gross	Ultimate irrigation potential Gross	Physical achievements during 1983-84 (In Ha.) Gross	Cumulative achievements at the end of 1983-84 Gross	Expenditure during 1983-84 (Rs. in lakhs)
(1)	(2)	(3)	(4)	(5)	(6)
A. Completed Projects					
1. Chalakudy	26,680	39,380	Nil	27,258	..
2. Peechi	25,500	23,168	Nil	23,918	..
3. Malampuzha	29,463	42,090	Nil	40,208	..
4. Neyyar	16,042	17,952	Nil	16,716	..
5. Pothundy	8,792	10,930	Nil	10,046	..
6. Gayathri	7,651	10,930	Nil	10,114	..
7. Walayar	4,536	6,470	Nil	6,503	..
8. Vazhani	7,668	7,130	Nil	4,226	..
9. Mangalam	4,816	6,880	Nil	6,608	..
10. Cheerakuzhi	2,268	2,828	Nil	1,746	..
B. On-going Projects					
1. Kallada	61,620	92,000	15,345	16,590	2,538.25
2. Pamba	21,135	49,456	4,680	43,138	414.07
3. Muvattupuzha	17,400	52,200	Nil	Nil	343.09
4. Periyar Valley	32,800	85,600	6,297	73,741	423.22
5. Chimoni	13,000	26,200	Nil	Nil	157.38
6. Chitturpuzha-Moolathara	15,570	28,960	540	25,655	104.16
7. Kanhirapuzha	9,720	21,863	5,485	16,217	403.92
8. Kuttiadi	14,570	35,850	2,632	34,331	245.23
9. Pazhassi	16,187	32,374	437	10,743	503.86
10. Vamanapuram	8,803	18,014	Nil	Nil	15.60
11. Idamalayar	13,659	39,318	Nil	Nil	520.41
12. Kuriarkutty-Karappara	11,736	23,472	Nil	Nil	18.60
13. Beyporepuzha	5,812	13,624	Nil	Nil	6.20
14. Kakkadavu	12,817	26,106	Nil	Nil	12.83
15. Attappady	4,323	13,041	Nil	Nil	46.28
16. Karapuzha	4,560	9,300	Nil	Nil	83.91
17. Meenachil	10,000	20,000	Nil	Nil	9.29
18. Banasurasagar	2,000	4,800	Nil	Nil	4.20
C. Research and Investigation	..	..	Nil	Nil	4.50
D. Modernisation	..	..	Nil	Nil	81.50
Total	410,028	759,936	35,416	367,758	5,936.50

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CHAPTER V

INDUSTRIES

Introduction

Observing about the industrial activities in the princely States, the Gazetteer of India, Vol. III, p. 482-483 states that "the leading progressive States planned and carried out a number of enterprises during and immediately after the war........The Travancore Government promoted and invested heavily in companies for manufacture of fertilizers and chemicals, sugar, rubber, cement, rayon, electro-chemicals, titanium and timber, soon after the war. It also set up departmental enterprises for the production of soap, porcelain, bicycles and an assorted variety of other goods.

While many of these enterprises became nucleii of growth and contributed to the industrialization of the region, the arrangements for their management, finance and marketing were not always satisfactory. Nearly all of them enjoyed guaranteed markets and various other concessions like free or cheap land, power etc., but these in turn imposed obligations of a constricting nature. Departmental enterprises were stifled by administrative control, while private managements were not always keen to give their best since their own equity was disproportionately small. There was no over all policy to regulate promotion, assistance and supervision, each project was taken up or aided on an ad hoc basis. Most of these enterprises had to be drastically reorganized in the fifties. These mistakes notwithstanding, there is no doubt that assistance and concessions from the State played a key role in the promotion of industrial entreprenuership and laid the foundation for broad based progress". Industry especially factory industry has got to acquire a dominant position in the economy, in terms of both output and employment, but it has climbed to a plateau from which further ascent has to be assured.

The State is not known to have any resource of oil or coal. The absence of basic minerals like coal, iron and copper is a serious impediment to industrial development.

The secondary sector covering mining and industry is not highly developed. Mining activity is limited by the meagre occurrence of minerals. But scope for the exploitation of resources in titanium, and china clay is not exhausted. The beach sands however are a good source of titanium bearing ilminite.

The traditional industries have a weak base. They are marked by low levels of productivity and little new investment is made in these industries. In the non-factory sector coir is the foremost. It provides employment opportunities to a large number of workers. But under the existing conditions workers are under employed and hardly get sufficient wages for their existence. In the factory sector also traditional industries like cashewnut, textile and coir factories are not modernized and due to low levels of production compared to the large working force engaged in them, these industries are not thriving.

Kerala has only a few modern industries with large capital investment. But they are like all modern industries, not labour intensive. In a State where there is large scale unemployment, careful planning is a desideratum. The excess workers, thrown out of employment will have to be absorbed in other industries which involves among other things the investment of high capital.

However there are some conditions favourable for stepping up the process of industrialization which has been slow and halting during the past decades in Kerala. Among them mention may be made of facilities such as cheap electric power, a well developed transport system and plentiful supply of intelligent and skilled labour. The hydroelectric potential of Kerala has not been fully exploited. It is quite substantial and is about 6% of the total hydroelectric potential of India. It is estimated that the hydro-electric power that can be economically developed in the State is 1500 MW 100% load factor or 2600 MW 60% load factor. If properly developed the generation of hydro electric potential can compensate for the absence of fuel fossil.

(a) OLD TIME INDUSTRIES

The three important traditional industries of Kerala are Coir, Cashew and Handlooms. These are dealt below, along with Handicrafts and Bamboo.

Coir Industry

Coir is the versatile fibre extracted from the husk of the coconut and enjoys a prominent position among hard fibres. The coir fibre or the coco fibre as it is known elsewhere, is also called the golden fibre. References to the use of coir as cables and riggings of mariners occur in the 13th century work—The Travels of Marco Polo. Coir secured a foot hold in the west because of its shining colour, tensile strength and resistance to dampness which helped diverse end uses. The use of coir as a flooring decoration in St: George's Hall Windsor, on the occasion of the christening of Prince of Wales—later King Edward VII in 1842, turned the search light on the new material and gave it a publicity impetus. The main use of coir yarn are fabrication of floor coverings like mats and mattings, manufacture of ropes, cordages fishing nets. It is also used as hopstring in the cultivation of hops. Coir fibre extracted from dry husk has world wide usage as oil filters, brushes and brooms and also for manufacture of rubberised fibre for cushioning materials. The great advantage which this fibre has over other industrial fibres is that it is very strong, will not usually get rotten by being exposed to moisture and heat and will not easily be attacked by white ants. Coir dust an important by-product is utilised as packing, stuffing and heat insulating material and for soil conditioning.

Although coconut is grown extensively in several countries and islands of South East Asia like Phillippines, Indonesia, Malayasia, Sri Lanka, the South Sea Islands etc., India is the largest producer of coir and coir goods. Within the country, Kerala accounts for the major part of the output. The lakes, the lagoons, and the backwaters fringed with coconut palms apart from imparting to Kerala its scenic beauty and providing one of the chief tourist attraction, provide the means of livelihood to a vast section of the population. Coir industry is located in the State primarily because of the natural retting facilities provided by the backwaters. The availability of these facilities is unique in the case of Kerala. In almost all other coconut growing areas of India, the coconut husks go waste because of the absence of natural retting facilities. Though the origin of the industry dates back to the 15th century the industry owes its rise to the pioneering efforts of a few European firms the first of which was established in 1859. [1]

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[1] An Irish immigrant from the U.S.A., James Darragh started a small coir manufacturing unit in Alleppey which became the nucleus of Kerala's Coir Industry.

In the early phases the manufacture of coir yarn was a cottage industry in which women of the lower income groups/ weaker sections of society predominated as it was a source of supplementing their meagre earnings. Hand spinning alone was carried on. The spinning wheel was unknown at this stage. The main purposes for which the coir spun were used were for fastening the roofs of thatched houses, fence making, ropes for tethering animals like cows and goats and for fastening planks into boats and country crafts and as anchor ropes of catamarams and big country crafts. Even today ancient houses, two hundred years old may be seen in certain parts of the Kerala coast, the roofs of which are fastened artistically with fine coir yarn uniform in twist and hard as iron wire, have remained in tact, notwithstanding the lapse of two centuries. This is an indication of the fact that good quality coir yarn can stand the strain of years.

The spinning wheel was probably introduced by the adventurous Portuguese, Dutch and English colonizers who came into close contact with the people of coastal areas like Fort Cochin and Anjengo. The manufacture of coir yarn on a commercial scale and the export of the yarn and mats and mattings manufactured out of it to outside countries, might have been an aftermath of the introduction of the spinning wheel.

Manufacturing Process

There are different stages in the process of production of coir yarn and these processes may vary according to the quality of yarn produced.

Retting.—The first process is the retting process. This is an elaborate and time consuming process spread over a year. For getting good fibre, raw coconut husks (green in colour) should be soaked in water within two or three days after husking. The raw coconut husks are then buried in pits dug in shallow backwaters, covered with mud and leaves and left for a period ranging from seven months to one year. A pit is capable of holding 1000 to 1500 husks. The wide expanse of backwaters in the State is a natural advantage. Periodical flow of salt water from the sea helps the decomposition and cleaning of the husks and in getting fibre of superior quality having golden yellow colour. Retting is done differently in various places. In the Anjengo area (Trivandrum district) husks are put in big circular coir nets called mallies and encircled with

coconut leaves. Weights are put over them. These husks when drenched in water, sink undermath and are kept fastened so as to remain the places where they are soaked. The retting of husks in pits dug out in the swampy areas near the lakes and lagoons are also in vogue. In the Cochin area retting of husks in pits dug out in swampy and brackish areas near lakes and fields is very common. Soaking of husks in tanks and canals are found in Sherthalai and Ambalapuzha regions.

Beating.—The well soaked husks are removed from retting husks after the duration of retting is over. They are thoroughly cleaned and beaten with short wooden mallets to remove the pith from the fibres. Fibre extracted from properly retted husks is of a light golden colour, clean and free from pith and other impurities.

Cleaning.—The fibre thus beaten have to be thoroughly cleaned and processed prior to being spun into yarn. The cleaning is done either by sticks or with the aid of a contrivance called "Pitchu pava".

Spinning.—Spinning is done by a spinning wheel with spindles attached. The spinning is done by women assisted by girls or boys who rotate the wheels.

The spun yarn is folded into hanks, whose length vary according to the variety. After sorting, the hanks are bundled for marketing.

Coir is either hand spun or manufactured through the aid of spinning wheels. While the yarn spun by hand is always soft and even in twist, those spun on wheels are usually of hard twist and not so even as hand spun. The difference in method of production is the basis for classifying coir yarn as 'hard twist' and 'soft twist'.

Main centres of the industry and different varieties of coir:

The whole of the coastal area in the south upto Kandasankadavu can be roughly called coir producing areas in this State. The industry varies in its importance and magnitude according to the natural facilities, local conditions and the aptitude and skill of the people engaged in the industry. The main varieties of coir now produced in the State may be roughly grouped as follows:

1. *The Anjengo variety.*—This variety of yarn is spun out of fibre extracted from husks properly retted in brackish

lagoons and lakes abundant in the area extending from Mayyanad to Thiruvallam. Very important centres of production of this variety of coir are Paravoor, Nedunganda, Vakkom, Kadakkavoor, Chirayinkeezhu, Anjengo, Perumathura, Azhoor, Kaniapuram, Murukkumpuzha and Panathara. This variety is broadly divided into two groups, Anjengo superior (hard twist) and Anjengo special.

2. *Ashtamudi.*—This variety of yarn is produced in the areas situated on either side of the Ashtamudi lake and the coastal areas lying adjacent to them. This is a kind of thick yarn used for the manufacture of rope. The main areas of production of this variety are Kallada, Munroe Island and Perumon. Mannu Mangadan is another variety of inferior yarn manufactured in the Chavara area. The fine monozite sand is admixtured with yarn and sold; hence its name. The important centres are Kavanad and Neendakara.

3. *Mangadan.*—It is another variety manufactured in the area according to demands in the market. The most important centres of production of these varieties are Mangad, Asramom, Kandachira, Perinad, Prakulam, Chavara South, Thevalakkara, and Kozhivila. According to the quality of twist and texture these are classed as special and ordinary.

4. *Alappadan.*—This variety is mainly spun by hand. Spinning with the aid of spinning wheel is also found in certain places. This variety of yarn is produced in the low lying areas on the lake and beach sides of the Karunagapally taluk and in a portion of the Karthikapally taluk. Main centres of production of this variety are Alunkadavu, Cheriyazheekal, Marthoorkulangara and Alappaduthura.

5. *Chavara Alappadan.*—This is produced in Thevalakkara. The husks are soaked only for a few days. It is hand-spun and is used for making mats. A small quantity alone is produced.

6. *Aratory.*—This variety is largely produced in places situated on either side of the Kayamkulam lake and the coastal areas of the Karthikapally taluk. Main centres of production of this variety are Arattupuzha, Mahadevicad, Mangalam, Karuvatta, Chingoli, Pallana, Muthukulam. In fact this area extends from Thottapally to Keericad in Karthikapally Taluk.

7. *Vaikom Variety.*—This is also another important variety of coir yarn produced extensively in the taluks of Vaikom, Shertallai and in some parts of the Trichur District. According to the quality and evenness of the twist this is divided into Vaikom Special and *Sada*. Main centres of production of this variety are the areas in the Vaikom and Shertallai Taluks lying on either side of the Vembanad lake; Vechoor, Thanneermukkom, Chengada, Poochakal, Chempu, Thrinayamkandam and Kumblangi in Cochin area. This is either handspun or spun by means of spinning wheels.

8. *Aroor Special.*—This is a kind of superior variety of the Vaikom yarn produced in the Aroor area situated on the northernmost point of the Shertallai taluk and at Idacochi and Kumblangi. But the quantity produced in this area is comparatively small when compared to the quantity of yarn of the other varieties. It is purely hand spun.

9. *Beach Yarn.*—This is a very inferior variety of yarn (handspun) produced by people living on the beach side and the interior of the taluks of Shertallai and Ambalapuzha. The one peculiarity about the production of this yarn is that it is carried on purely as a cottage industry during off times out of fibre extracted from husks soaked generally in ponds and tanks for a few days or at the most a month. The main centres of production of this variety are places like Muhamma, Peruneermangalam, Mararikulam, Punnapra and Mannancheri.

10. *Parur Vannam.*—This variety of yarn is produced in large quantities in the Trichur district. The main centres of production of this variety are Vavakkadu, Chittattukara, Pattanom, Kottapuram, Cranganore, Cherai and Njarakkal. Superior varieties of this quality of yarn known as Parur special are also produced in the above areas.

11. *Muppiri.*—This is a kind of thick yarn produced by means of a spinning wheel in certain parts of Nagercoil and Neyyattinkara taluks. The main centres of production are Manavalakurichi, Ethamboli and Thiruvallam.

12. *M. K. Yarn.*—This is mostly manufactured in the Cochin area. The important centres are Kumblangi, Mannasseri and Anthikadavu.

13. *Rope Yarn.*—This is mostly manufactured in Malabar and in a portion of Cochin. Kandasankadavu and Manaloor are the main centres.

14. *Thin Rope Yarn.*—It is mostly hand spun and is manufactured in Maradu, Chittur and Elankunnapuzha.

Growth of the coir matting industry

The coir mat and matting industry is mainly factory oriented. Coir yarn from the producing areas is bought and properly graded for thickness, cleanliness, colour and twist by the factories manufacturing mats, mattings rugs and carpets. The industry is concentrated mainly at Alleppey, Sherthallai and Palluruthy. Out of the 94127 production units comprising of factory type units, small scale non-household units and household units in the State, 62567 are functioning at Alleppey, i.e., nearly 67%. Mats and mattings are woven on wooden looms similar to the handlooms employed for weaving cotton fabrics but heavier. Manipulations are made by skilled craftsmen with remarkable speed and accuracy. The finished products of coir are chiefly hall and stair runners in a variety of patterns and richness of colour and design; rugs, carpets and mourzaks and door mats in a large variety of quality. The mattings are woven as cloth, two treadle, three treadle, four treadle, multi treadle and on looms fitted with Jacquards for obtaining more intricate designs in weaving. Besides woven patterns, stencilling of designs are also extensively in use.

Coir industry provides direct employment to about three lakhs of people in Kerala and hence plays a vital role in the State's economy. The spinning sector accounts for about 72% of the Coir workers and the beating sector about 16%. The industry today is hampered by several bottlenecks such as inadequacy of raw materials, competition from synthetic fibres etc. As the industry is a highly labour intensive one, any attempt at modernisation will also bring in its trail labour displacement. A major measure advocated and implemented by the State to save the industry is the organisation of workers in viable co-operatives. This development programme was initiated from 1951 onwards. With this major objective in view, the successive five year plans framed schemes for the development of the industry. Though the amounts set apart for coir development scheme under the various five year plans have been on the increase, the vagaries of export market, inadequacy of the internal market and competition from synthetic substitutes aggravated the problems of the industry.

An integrated development scheme covering all aspects of the industry was formulated by the State Government in 1968-69 for restructuring coir co-operatives. From 1973-74 onwards the Government of India also assisted the growth of coir industry. Special assistance from Government of India and financing of coir co-operatives by Reserve Bank of India helped to some extent in restructuring coir co-operatives. However the Central assistance for this scheme leaves much to be desired. The State proposes to bring at least 60 per cent of the coir workers under the co-operative fold. The four Central Coir Marketing Societies were amalgamated into a State Level Marketing Federation. At present there are 429 primary societies, 43 manufacturing societies 3 thondu societies, six small scale producers co-operative societies, and one Marketing Federation in the State with an aggregate membership of 2.5 lakhs coir societies in the State undertake direct production and pay wages directly to workers.

Despite the efforts at co-operativisation of Coir industry, the major portion of coir work force still remains outside the co-operative fold. Steps are being taken to make the co-operative sector a formidable force in the industry. Non-availability of required raw materials at reasonable price is one of the main factors hindering the growth of the industry. A systematic approach to procure and distribute the raw materials is highly essential for the survival of the industry. The year 1980-81 was an year of unprecedented crisis to the coir industry due to cumulative effect of various factors. But the State Government took prompt measures to save the industry from ruin. Many of the ills of the industry are attributed mainly to unhealthy trade practices of exporters. The problems of export marketing should be well analysed and prompt measures taken to solve them. The establishment of large number of selling outlets all over the country with proper sale promotion measures can do much to stimulate exports. The provision of adequate quantum of inputs and effective expansion of both the external and internal markets will add a new dimension to the development of this traditional industry.

Coir Co-operative Societies Salient Features (1986-87)

Type of Society	No. of Societies	No. of Members (in 000)	Husk Purchased		Yarn Produced		Wages Paid	
			No. Lakhs	Value Rs. in lakhs	Quantity (Tonne)	Value Rs. in lakhs	Workers in 000	Wages Rs. in lakhs
1. Primary Coir Co-operative Society	429	222	1264	152	9587	663	75	375
			Value of Product (Rs in lakhs)		Workers benefited	Wages paid (Rs. in lakhs)	Value of Exports (Rs. in lakhs)	
2. Manufacturing Societies	23	3522	610		2348	N.A.	534	

Export of Coir and Coir Products from India during 1986-87

Products	Quantity (in tonnes)	Value (Rs. in lakhs)
1. Coir Fibre	1	0.09
2. Coir Yarn	12105	1207.73
3. Coir Mats	7924	1354.70
4. Coir Mattings	2892	534.16
5. Coir Rugs & Carpets	236	40.13
6. Coir—Other Sorts	21	3.31
7. Coir Rope	30	3.13
8. Curled Coir	5	1.21
Total:	23214	3144.46

India exported coir and coir products worth Rs. 31.45 crores during 1985-86 the highest for the last five years. (Source: Chairman, Coir Board). However, quantity-wise, the exports had been on the decline. This was because of stiff competition from synthetic substitutes and natural products like Chinese grass mats, price disadvantages and delay in delivery. Coir could still command a good market abroad if timely supplies could be ensured at reasonable prices. The International Trade Centre (I. T. C.) at Geneva has agreed to provide assistance for the development of coir products with funds from the Swedish International Development Authority. The I.T.C.—S.I.D.A. technical co-operation programme for coir floor coverings provides funds totalling 5.61 lakh dollars for a three year period. The programme covered product adaptation and design, publicity support, market research, information system and man-power development.

Internal sales of coir and coir products had been increasing steadily with the sales touching Rs. 2.5 crores in 1985-86 as against Rs. 2.10 crores in 1984-85.

Cashewnut Processing Industry

The cashew processing industry has a place of importance in Kerala. The State enjoys a dominant position in the industry in India. Apart from exporting cashew kernels, cashew shell oil is also extracted. The U. S. A. and Japan being the principal markets for cashew kernels and cashew shell oil respectively, the money earned comes in the form of the highly coveted dollars and yens. It was an enterprising industrialist, Mr. Joseph Pereira who conceived in 1925 the idea of making the cashew industry an organised one. The industry is concentrated within a radius of 40 kilometres of Quilon, with a sprinkling of factories in other cashew growing areas of the State and its neighbourhood. The main factor responsible for this high degree of localisation seems to be the element of skill required. Though apparently a minor operation, de-shelling and peeling of cashewnuts without breaking them requires a high degree of practice and patient handling. Women are adept at such operations, which account for the near total dominance of women in the industry—90%. These skills have grown in and around Quilon over the past few decades and have contributed to the growth of the industry in this area. The cashew industry is one in which very little machinery is used. Capital investment in the form of fixed assets is small. Often, production is carried on in an open thatched shed. The extraction of cashew kernel is done through a special and careful

process. Roasting, shelling, peeling and grading are the various processes involved in the production of kernels. Machinery for equipment is used only at two stages—roasting and drying. The cashew kernels are rich in protein and minerals, phosporous, calcium, and vitamins A & B. Compared to most edible nuts, its fat content is less. The following figures of imports and exports will convey the present position of the industry. There is an Export Promotion Council for cashew with headquarters at Cochin to foster exports. As mentioned earlier cashew shell liquid which is a bye-product of the industry is also an important item of export. A phenolic oil with high iodine value the C. S. L. is superior to conventional resins. It is resistant to heat, chemicals, water and mineral oils. Foundries use it for core and mould making, paint and primers from C. S. L. resins resist water solvents, heat and corrosion not to speak of its importance as Anionic and non-ionic surface active agents.

When cashew processing became commercial in 1925, only very few persons were employed in it. Now the present position is as follows (as on 1-1-1983).

District	*No. of Factories*	*Employment*
Trivandrum	16	9,166
Quilon	229	107,200
Alleppey	3	6,637
Ernakulam	2	346
Trichur	5	2,575
Kozhikode	2	719
Cannanore	3	1,094
Total	262	127,737

It also provides scope for ancillary industries such as tin factories, saw mills, transport etc. The labour employed directly in the cashew industry has the coverage of the various labour welfare laws like the Factories Act (1940), Maternity Benefit Act (1957) and Employees State Insurance Act (1948). Minimum Wages were introduced in the industry in 1958 and, are being revised periodically. From 1962 the provisions of the Employees Provident Fund Act has been extended to the industry. The labour in the industry being one of the best organised in the State, the wage level is quite high compared to other States. The workers having received annual bonus since 1946.

Although the cashew factories employ a large number of workers, they do not provide continuous employment all through the year. The factories are often shut down owing to insufficiency of

raw cashewnuts. In a year the cashew factories could work only for less than 85 days. The Kerala State Cashew Development Corporation was set up in 1969 to relieve the unemployment faced by the workers. As they work today the factories are dependent considerably on imported nuts. These nuts are imported from Tanzania, Kenya and Mozambique. The volume of imports which had steeply risen (till 1978) alongside the growth of the industry has now declined owing to various factors like drop in total crop available in the cashew cultivating countries of Africa, development of processing units in these countries, resulting in reduced exports and emergence of China as a potential buyer from Tanzania because of political tie up. The domestic production is inadequate for sustaining the industry. The internal demand for nuts is negligible. The industry's progress is conditioned by the changing preferences of the importing countries like U. S. A., U. S. S. R., and Japan. Fluctuations in the external price level, has repercussions of a harmful nature for the industry.

IMPORT OF RAW CASHEWNUT

Year	*Quantity in tonnes*	*Index*	*Value in crores*	*Index*
1972-73	197,938	100	31.81	100
1973-74	150,249	76	29.80	94
1974-75	160,358	81	36.60	115
1975-76	137,196	69	33.56	106
1976-77	75,122	38	18.33	58
1977-78	56,299	28	17.98	57
1978-79	20,496	10	9.16	29
1979-80	24,222	12	11.60	36
1980-81	25,715	13	19.57	62
1981-82	28,582	14	36.22	114
1982-83	1,485	0.75	1.41	4.4
1983-84	26,877	13.5	22.12	70
1984-85	33,215	17.0	36.49	115
1985-86	23,310	11.8	25.88	80
1986-87	49,045	24.8	69.46	218

FOREIGN EXCHANGE EARNINGS FROM CASHEW INDUSTRY

(*Rs. in crores*)

Year	*Export value of*			*Import value of raw nuts*	*Net foreign Exchange Earned (Rs. in crores)*
	Cashew kernels	*Cashew shell liquid*	*Total 2+3*		
1975-76	96.13	1.49	97.62	33.56	64.06
1976-77	105.99	1.08	107.07	18.33	88.74
1977-78	149.54	1.07	150.61	17.98	132.63
1978-79	80.37	4.80	85.17	9.16	76.01
1979-80	118.26	14.59	132.85	11.60	121.25
1980-81	141.09	6.94	147.93	19.57	128.36
1981-82	181.50	2.35	183.85	18.37	165.48
1982-83	135.36	1.80	137.16	1.41	135.75
1983-84	150.87	1.36	152.23	22.12	130.11
1984-85	179.68	2.03	181.71	36.49	145.22
1985-86	215.27	1.25	216.52	25.88	190.64
1986-87	334.11	1.46	335.57	69.46	266.11

Handloom

The handloom industry is one of remote antiquity and its products have always been wonderful things of beauty coveted and consumed by the countries of the ancient world like Egypt, Greece and Rome. The fineness of the Indian handloom fabric had been the wonder of the westerners and they were ranked as the highest work of art. The Industrial Revolution in England and the progressive tightening of the channels of trade in calicoes[1], and cotton cloth by the Government in that

[1]Incidentally the word calico is derived from Calicut, whence the cloth was first introduced.

country led to a rapid decline of the industry. The handloom industry was not only deprived of its European market, but its home market was also with steadily growing intensity assailed by the machine made goods from the western countries. Within the country, the textile markets were flooded with cheap mill cloth produced on mass production basis in the west and under cut throat competition from this cheap stuff the handloom cloth lost its hold on the market and even up to the present day has not recovered from the breach made on its market. This was aggravated further by the change in sartorial habits effected by the middle classes which gradually spread to the lower income groups with the consequence of still further reducing the capacity of the home market to absorb handloom cloth.

The skill of the weavers has been of the highest order and the fabrics woven by them have been admired as of supreme excellence by connoisseurs in the line. The Salias are the most important community which have from time immemorial pursued weaving as their hereditary profession. The existence of this community has helped the industry to survive the vicissitudes of fortune[2]. The introduction of the flyshuttle by the German Mission as also the frame loom marked the beginning of a new epoch in the history of handloom industry in the State. They gave a definite impetus to the growth of the industry and to reduce cost of production. The rapid growth of the handloom factory industry specializing in excellent furnishing fabrics and attractive shirting and coating clothes had made the industry broad based than before. The furnishing fabrics secured a good market not only within the country but outside as well. These factors have helped to sustain the handloom industry. It must be noted that the handloom industry does not produce a single type of cloth but a multitude ranging from carpets and furnishing fabrics to lace bordered superfine dhothies and sarees. A territorial specialization too is perceptible. For example, Cannanore and Kozhikode districts specialize in manufacture of table clothes, window curtains, bed spreads, coating and shirt pieces using lower counts of yarn upto 60s while the weavers in Trivandrum district are accustomed to the weaving of dhothies, and finer varieties using higher counts of

[2] During the Dewanship of Ummini Thampi in the earlier part of the 19th century, weaver families were settled in Balaramapuram. This accounts for the fairly high concentration of the industry in this region.

yarn upto 120s, gold lace threads etc. While most of the products in northern districts go to the foreign markets, the products in other districts reach only domestic markets.

The Governmental effort to tackle the problem of handloom industry during the pre-independence period started in 1934 when the Government of India announced an annual subsidy of Rs. 5 lakhs for five years to the Provincial (State) Governments. This meagre financial assistance had the advantage of arousing some interest in the co-operative organisation of the industry at least in certain parts of the country. After a temporary boom during the period of world war II and a few years thereafter the handloom industry faced severe crisis in 1952 by the fall in sales and accumulation of unsold stock. Acute unemployment of handloom weavers and heavy financial loss to producers were the agonising effects of these state of affairs. The All India Handloom Board was constituted in 1952, with comprehensive powers to formulate policies to rehabilitate and consolidate the industry. The creation of Cess fund for financing the handloom industry through subsidy or loan to weavers co-operative societies and for starting handloom sales organisations was the major steps taken by the Government to tackle the situation. The rebate scheme to promote sale of handloom cloth was introduced in 1954. The institutional finance scheme, by which the working capital needs of weavers co-operative societies were to be met by the Reserve Bank of India became operative in 1957.

Apart from the problem of accumulation of unsold stock and consequent unemployment the scarcity of yarn also rocked the industry occasionally. A side effect of these problems confronted by the industry and the measures taken by Government to tackle them was the importance acquired by the co-operative movement in this sector. There are nearly 600 weavers cooperative societies in Kerala, though more than 100 of which are, unfortunately, facing liquidation.

The high powered study team under the Chairmanship of Sri B. Sivaraman (1974) which went into various problems facing the industry recommended in its report submitted to Government of India various measures covering organisational structure, technical development, Finance and credit facilities, marketing and export problems. The development activities in the handloom sector are now largely guided by these recommendations.

There are about 95,000 looms in the State. 43,800 looms which is more than 46% of the total in the State are concentrated in Cannanore district. Trivandrum district stands second in concentration with 19,700 looms followed by Kozhikode district with 14,500 looms. While almost the entire looms in northern districts are frame looms which are quite amenable to modernisation, most of the looms in Trivandrum district are pit looms. The prototype of the looms in Cannanore district is believed to have been brought to this land by Germans.

30% of the total handlooms in the State are in more than 2,000 factory type units, big and small, and the remaining are in nearly 22,000 household units. There are nearly 1,600 factory type units in Cannanore district most of which are in the private sector. About 1.5 lakh persons are directly engaged in this industry as weavers, winders, warpers and other workers. Another one lakh people earn their lively-hood indirectly by this industry. Inspite of the comparatively higher wages the plight of most of the workers are far from satisfactory. The ups and downs in the foreign market, the seasonal nature of domestic market, occasional scarcity in yarn etc. are some of the reasons for the under employment in this sector. The co-operativisation has helped a lot in preventing the poor weavers from being exploited by the middle men like master weavers and private traders. Many schemes for developing co-operatives are being implemented both by the Government of India and the State Government.

Production

The industry is an important foreign exchange earner. Handloom fabrics to the tune of Rs. 2.5 crores are exported directly by the exporters in Kerala to the U. S. A., F. R. G., U. K., France, Japan, Australia and Netherlands. The products exported are garments, fabrics and made-ups. However the bulk of the products in Cannanore and Kozhikode districts are purchased by the exporters operating in other States. Handloom products have found much needed consumer acceptance in the overseas markets.

By diversification of production and with modern processing facilities the Kerala handloom fabrics can compete successfully, with mill-made goods both in domestic and foreign

markets and the production will be augmented to 100 million metres worth Rs. 45 crores by the end of the VI Plan.

Finance and Credit facilities

Strengthening of the share capital base of the primary handloom weavers societies so as to enable them to avail of Reserve Bank of India cash credit facilities and other institutional financing comes under the general strategy for the development programmes for the handloom industry. Under the Reserve Bank of India scheme of Handloom finance the eligible primary weavers societies can avail of cash credit for working capital at 6.5% interest out of which 3% will be subsidised by the Government. The Credit limit sanctioned by the Reserve Bank of India rose from Rs. 40 per loom in 1957 to Rs. 1,500 per loom in 1976-77. It has been enhanced to Rs. 2,000 per loom in 1979-80. 245 weavers co-operative societies have been covered by the scheme and the cash credit accommodation now being sanctioned comes to Rs. 447 lakhs during 1979-80.

Under the Differential Rate of Interest Scheme individual Handloom Weavers with a monthly income of less than Rs. 200 from non-agricultural sources are given loans from commercial banks at 4% interest.

Under the tiny sector development scheme bank finance upto Rs. 25,000 at the interest rate of 9½% in backward areas and at 11% in other areas is also available for the handloom sector.

National Co-operative Development Corporation assistance is also available for construction of work-sheds for primary weavers societies, construction of godowns and establishment of showrooms for Apex society etc.

Market Promotion

The Kerala State Handloom Weavers Co-operative Society Limited, which is the apex body of the weavers co-operative societies in the State is primarily responsible for the marketing of handloom cloth produced in co-operative sector. This Apex Society with an authorised share capital of Rs. 300 lakhs has a membership of 371 out of which 368 are primary weavers co-operative societies, the remaining being 2 spinning

mills and the State Government. The paid up capital of the society is Rs. 114.64 lakhs out of which Rs. 105.44 lakhs is government's share.

The Apex society has a net work of sales out-lets all over the State. There are 232 sales depots and showrooms within the State and 12 showrooms outside the State. It has also got mobile exhibition-cum sales vans and pre-fabricated movable sales units. The details relating to the activities of Hantex are furnished in the table appended.

The Reserve Bank of India has sanctioned cash credit of Rs. 125 lakhs for marketing of handloom cloth and Rs. 30 lakhs for trade in yarn. With all these facilities the Apex Society could not undertake the marketing of the major portion of the products of primary societies. The annual sales turnover of the Apex Society comes around Rs. 12.00 crores.

Subsidy for the rebate on sales of handloom goods is the major incentive for the sales of handloom cloth. Rebate is allowed for sale of handloom cloth for 101 days in an year, at 20% with the assistance of Government of India. The annual expenditure on this account alone comes to about Rs. 70 lakhs.

The publicity support, assistance for conducting exhibition sales etc. are some of the schemes taken up by the State Government for boosting sales.

Other important schemes

Apart from the schemes for finance and credit facilities and market promotion mentioned above, there are schemes for organisation and expansion of factory-type weavers industrial co-operative societies, expansion of existing dye houses and establishment of new ones, modernisation of looms, weavers welfare, welfare schemes, intensive development projects and export production projects etc. for the over all development of the handloom industry in the State.

Assistance is also given for the construction of work-sheds, erection of looms etc., for the organisation and expansion of factory-type weavers industrial co-operative societies. Assistance in form of equipment-grants for the establishment and expansion of dye house is given to the weavers' societies.

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Managerial assistance in the form of free service of personnel or subsidy for managerial costs are given to the weak societies before they settle themselves in business.

Assistance of the modernisation of looms is given to members of the weavers societies. Contributory thrift fund, assistance for renovation of weavers house, scholarships to weavers' children etc., are the welfare schemes.

There are special schemes for the training of scheduled castes and tribes in weaving and for organising factory type industrial co-operative societies exclusively for scheduled castes and tribes.

Intensive Development Projects and Export Production Projects

The Intensive Development Projects and costing Rs. 185 lakhs and an Export Production Project costing Rs. 40 lakhs were sanctioned by Government of India in 1975-76. The Intensive Development Projects with headquarters at Trivandrum and Cannanore cover 10,000 looms each and Export Production Project, Cannanore covers 1,000 looms.

Establishment of modern well-equipped worksheds to accommodate 100 looms each on co-operative basis, modernisation of loom cloth etc., are the programmes undertaken by these projects. These projects are implemented by the Kerala Handloom Development Corporation.

Kerala Handloom Development Corporation

The Kerala Handloom Development Corporation was established with a view to assisting the handloom weavers outside co-operative fold to diversify, improve the quality and marketing of products. The Corporation was registered in 1968 with authorised share capital of Rs. 100 lakhs.

At the initial stage the activities of the Corporation were confined to issuing cash loans to its members and later trading in yarn. The Corporation is now entrusted with the responsibility of implementing the Intensive Development Projects and Export Production Project. The Corporation is also assisting the weavers in the private sector in diversification, quality improvement and marketing of their products

It acts as a link between the weaver and the consumer and helps to eliminate the middlemen.

Kerala Garments is a subsidiary Company of the Kerala Handloom Development Corporation. It is a unit for the manufacture of exportable readymade garments using Kerala Handloom fabrics. The unit went into production from 1st May 1978. It provides direct employment to 120 persons, most of whom are women.

With the decline in foreign demand for some special Kerala Handloom varieties like crepe, some sort of stagnation in production and unemployment and under-employment are experienced in recent years. However, there is no reason to believe that the future of the handloom industry is gloomy as the consumers both far and near will never reject the Kerala Handloom fabrics which have got certain special distinct features. The furnishings and dress materials with exquisite colour combinations will remain a monopoly of the handloom sector especially of northern Kerala. Dhothies, Neriaths, Thorths etc., are indispensable for Keralites wherever they are. The modern processing facilities accessible to handloom sector will cater to the need of the changing pattern of fashion.

This industry will continue to give employment to thousands of weavers in Kerala in the coming future also since very many new schemes for the development of the industry are also under contemplation.

The Handloom Reservation Act 1985 was passed reserving 22 items of production for the Handloom sector, with effect from 1st April 1986; compared with what was obtaining earlier, the number is twice as large and the range much wider. Whereas the base for the reserved items was mainly cotton, the current list includes some pure silk and woolen goods and synthetic fibre-blended cotton varieties too. Stiff penalties have been prescribed for contravention of the provisions. The new textile policy enunciated in 1985 represents by far the most comprehensive approach to the Handloom industry's problems.

Frduction and Productivity under Handloom Industry

Sl. No.	Item	1984-85
1	Estimated total No. of Handlooms in the State	95,000
2.	Number of looms in the Co-operative Sector	54,000
3.	Percentage of (2) to (1)	56.8
4.	Number of Handloom Co-operative Societies	578
5.	Co-operative Sector:	
	(i) Production of Handloom Cloth (Million metres)	42.5
	(ii) Value of production (Rs. crores)	26.5
	(iii) Productivity (Metre-loom)	787
6.	Unorganised Sector:	
	(i) Production of Handloom cloth (Million metres)	40.00
	(ii) Value of Production (Rs. crores)	25.00
	(iii) Productivity (Metre/loom)	975
7.	Total Co-operative and Unorganised Sector	
	(i) Production (in million metres)	82.5
	(ii) Value (Rs. crores)	51.5
	(iii) Productivity (Metre/loom)	868

Details relating to the Handloom Apex Society (Hantex)

	Particulars	1984-85 (Rs.)
1.	Sales turnover	10.13 crores
2.	Procurement of cloth	8.68 ,,
3.	Purchase of yarn	2.28 ,,
4.	Distribution of yarn	2.24 ,,
5.	Garments sold	4.33 lakhs
6.	Janatha Production	38.73 ,,
7.	Polyster shirting, sarees, double veshties, single veshties production	14.76 ,,
8.	Processed goods production	3,000 metres
9.	No. of Exhibitions conducted	55

Handicrafts

Handicrafts are a valuable part of our heritage. They reveal the creative urge of the community and disclose its aesthetic carvings. In them is embodied the accumulated experience handed down traditionally from father to son. Handicrafts are mostly run on individual basis. The Artisan or craftsman works in his home assisted by the members of his family. Only in exceptional cases is the craftsman employed by the dealer, the co-operative and the workshop owner providing tools, worksheds and other amenities.

Kerala's handicrafts have a hoary past dating to the 17th century. The major handicrafts of the State are bell metal, carving, ivory, horn and wood carving, screwpine, mate making, bamboo and reed weaving, palmyra leaf weaving, lemongrass mat making, canc and rattan work, embroidery and lace making and lapidiary work.

Most of the handicrafts have been dealt with in detail in the District Gazetteers. However the major crafts are detailed below in brief.

Ivory carving

Among the legendary merchandise that made India fabulous through the then known world was ivory, like frankincense and muslin. The significant fact is that some of the aura is sustained even to this day because of the continued skill and delicate touch of the ivory carvers. It is not surprising that a vedic text includes it among the noblest of crafts. Ivory is a dental substance, placed by chemists between bone and horn. The craft has confined itself to the tusks of the elephant which are distinguished by the decussating, curved lines on the surface of the transverse section. The tusk is solid for half its length, circular or elliptical in section, free from pores or harshness common in bone, but an exquisite smoothness which ideally lends itself to the niceties of the turners and carver's deft fingers. The supply being restricted unlike other raw materials, ivory has remained exclusive and expensive and caters to a smaller clientele. Kerala over the years has won great renown as a centre for ivory carving. It seems to have enjoyed patronage at home as also received added encouragement from overseas markets, since Kerala had trade links with Arab and even the Mediterranean countries. One of the Maharajas of Travancore not only took interest in the craft but actualljy had an arts and crafts school started to enable young people even from the non-artisans to get training. Even though they learnt in a modern style school, these youngsters nevertheless maintained the high standards of the old masters in grace and dignity. Trivandrum is one of the

biggest production centres with nearly three-fourths of it is exported overseas. Kerala's noted item is statuary specially the medium size figures, designed in superb dignity and such perfect form that they are a delight to look at no matter from which angle one views it. The State has also a tradition of beautiful form of painting in Ivory.

Metalware

Kerala is also the home of the bell metal. Bell metal is a mixture of copper and tin, and is most attractive with its soft surface and the old gold tint. It is mostly used in cooking dishes and eating plates as it does not tarnish and needs no tinning like copper. The cooking vessels, wide open with flat or curved rims called *urulis*, are classic in line and dignified in their simplicity and they make prestigious tableware. Huge cauldrons called *Varpu* are made for use in temples. A simple oil can with its swirling lines and tapering up like a candle could indeed be taken for a Greek vase, so chaste is its outline. The State has also a great tradition and wide range in tumblers. Many sizes, very elegantly shaped. There is a special jug, the lower part rounded in convolutions and a long spout jutting out at the side. Trivandrum, Mannar, Irinjalakuda and Kasaragode are the bell metal centres. In the ornamental line there are a variety of jewel boxes, oval or square, one with eight sides, fastened in front by a big bold ornamental chain, pan boxes, lime jars, each with a different artistic finish and floral or creeper design.

Moosaris are the traditional artisans engaged in bell metalware and belong to one of the six classes of Kammalas. Kammala means maker of an article pleasing to the eye.

An unusual object is the metal mirror, a special product of Aranmula, a village near Chengannur in Kerala, made out of an alloy of copper and tin, its polished face resembling glass by its ability to reflect. The artisans are said to have stumbled on this when they were making a crown for their deity. The temple chief was so delighted with this mirror, that he included it among the eight auspicious items used in worship, and the deity has since been known as the idol of mirror.

Wood Carving

The best in Kerala wood carving is seen in religious figures whether it be in a temple or church. Secular objects like warriors wielding their swords or ladies adorning themselves in which the

drapery and ornaments show a high quality of craftsmanship are greatly in evidence. There are any number of churches that are outstanding monuments of superb workmanship. The altar, the pulpit, the tabernacular ceiling above the chancel are all beautifully carved. Now the trend is to produce christian religious statues along with those of Hindu deities as well as animals for which Trivandrum and Trichur are noted. Changanacherry and Ernakulam specialise in such Christian religious figures as also ordinary human figures.

Kerala produces elephants (wood) in profusion in a variety of postures and sizes from the microscopic to the huge. They are shown pushing and pulling logs of wood or caught in a fierce duel. There are figures of women at work on various vocations. The wood used for such figures is kumbil while rosewood or teak is used for animals. Rosewood beds are a speciality. The legs and the end panels are sometimes carved, but now mostly plain; chests and tables, stools, book stands and book ends etc. are elaborately carved.

Marquetry though comparatively new to Kerala (not traditional) has developed fairly well. For apart from the charm it gives to the article, any piece of wood in spite of its anatomical defects due to malformation can still be purposefully utilised. Only superior types of wood like teak, rose, agil (white cedar) are used here to prevent easy cracks.

Generally simple articles are made as there is considerable labour involved in this. Trays of various types, teapoys, stools. vases, boxes, ash trays are the usual items, occasionally photo frames are also made.

Another effective style of decorating wood is by binding chests and boxes with brass bands, plain or with patterns. The body is dotted with brass pieces, appliqued with designs or embossed with heavy motifs as flowers. Kerala is one of the regions which has a rich variety in this. *Nettur petty* is a traditional jewel box of unique shape with eight sides, four at the bottom and four at the top, converging above in a line, and the joints fully covered by rich varied decoration.

Fine specimens of painting on wood can be seen in some of the Kerala Churches which rich in wood carvings are often embellished by appropriate colours. The foliage, the floral designs, raiments of the personages depicted, wooden structures, borders with balconies. pedestals, all stand out festively, each harmoniously melting into the other like tones in an orchestra.

Basket making, Mat Weaving and Cane Articles

There is a perfectly gorgeous square bamboo box made in Kerala, a beautiful study in black and white. The Central part is black with a big white design where the lids come to rest. There are white twill worked bands round the bottom rim and white chains covering the entire lid on a black ground, and a design in black and white in the middle of the lid. It is known as *mulapetty* and is also meant for keeping valuable clothes.

Kora grass mats have attained exceptional excellence in Kerala The grass grows in marshy lands. The initial cutting and collecting of grass is done by craftsmen themselves. The raw grass is triangular in shape. Screwpine is another shrub from which mats are made. Its sword shaped leaves grow spirally. Two varieties are used in mats, the short useful for a large number of items as it can be both bleached as well as dyed, the tall for rough mats for drying grain. Screwpine mats have an old romantic history for they were once the favourite of sailors who used to employ them as sails for ships. Beautiful straw table mats with exquisite designs and of several sizes are exported. The multi coloured mats are now common articles of home decoration.

Stone carving

Stone carving has a very ancient history in Kerala, sculpture belonging to the historic period dates back to the early part of the century, which contains some extraordinary dancing figures. The Padmanabhaswamy temple in Trivandrum is a stone house of fine sculpture. The State is rich in granite which is largely used in image making for which Chengannur is an important centre. Apart from the icons this stone is also used for providing household articles as also for structures.

The special variety utilised in image making is known as *Krishna sila* which seems available from only one place. Trittala near Pattambi. A legend endows this place and the stone with special sanctity because of the virtue of a holy man who lived there and had the same blest. The community, which makes the images is known as *Kallassari* one of the 5 *Kammalas*. For polishing wax they use a mixture of their own, made of sealing wax and steel powder, melted and moistured.

From a survey conducted by the State Industries Department in 1960 it was seen that the Handicrafts Institutions of Kerala were able to provide employment to about 14,700 people concentrated in 34 Crafts.

According to the various programmes envisaged by the Five Year Plans the production of *Kathakali* articles, ornaments, sculptures, wood articles, articles made with coconut shells and wax are given encouragement.

In the first Five Year Plan there was no particular scheme for the development of handicrafts industry. In the second Five Year Plan Rs. 23.78 lakhs were used in this sector. But the decision of the All India Handicrafts Board to discontinue the training centres affected the establishment of such centres in Kerala. Thus the expenditure in handicrafts development scheme was limited to Rs. 8.5 lakhs during the second plan period. During the 3rd Plan the State could spent Rs. 30.91 lakhs in this sector from a total of Rs. 35 lakhs envisaged for the purpose. During this period 22 construction training centres were established in the State. They could give a good inducement for the development of handicrafts industries of the State. The three service centres and the two research centres organized during the third Plan Period could do much in the development of handicrafts. The Handicrafts Apex Co-operative Society established at Ernakulam and the central handicrafts emporium established at Trivandrum were very good selling centres of handicraft articles. The quality control centres organised by the government also provided for the development of the industry. The primary co-operative societies organised with a view to developing the production and sales of these articles was also an important achievement to the industry. During the end of the 3rd Five Year Plan Period there were about 300 Co-operative Societies in Kerala which were engaged in the production and marketing of handicrafts. During the sixth Five Year Plan the amount spent in the sector was Rs. 315 lakhs and in the Seventh Plan (1985-90) it will be Rs. 500 lakhs. The Five Year Plans envisaged various programmes for the makers of the handicraft articles to get better wages and also to gain foreign exchange for the country.

According to the present estimate about 50,000 people are engaged in handicrafts industry in the State. Many of them do get but only partial employment. Scarcity of raw materials, difficulty in marketing finished products and reluctance of the craftsmen to adapt themselves to changing consumer taste and preferences are the major problems. These people can get full-time employment only if and when marketing facilities are developed both in India and abroad.

Handicrafts Corporation

In 1969 the State Government established a Handicrafts Development Corporation for the betterment of the people engaged in the handicrafts industry. The corporation took control of the

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S. M. S. M. Institute at Trivandrum and the handicrafts emporiums of New Delhi, Madras and Coimbatore. Before long the common facility centres at Trivandrum and Madras and the wood seasoning plant at Cherpu also came under the control of the corporation. The common facility centres under the control of the corporation provided employment opportunities to a large number of people who are engaged in sculpture and who work with wood and ivory. The corporation distributes raw materials among the labourers and buys the finished products from them. Master craftsmen are appointed in the centres to advise the labourers in the art of sculpture.

The corporation has a wide net work of emporiums within and outside Kerala to promote Kerala Handicrafts. It also exports handicrafts. In 1982-83, the corporation sold handicraft articles worth Rs. 130 lakhs. With the establishment and functioning of the corporation, the internal and external markets of these products have improved very much. The corporation participates in International Trade Fairs to boost exports, renders financial assistance to artisans, and provides facilities including supply of improved tools to artisans.

The Kerala Artisans Development Corporation

This Corporation was registered in October 1981 to render a package of assistance to the poor artisans belonging to the blacksmithy, carpentry, bronze, coppersmithy, goldsmithy, stone masonry, pottery and shoe making trades. The Corporation programmes to set up primary production units in different centres to accommodate to artisans in each centre as a self employment programme. The primary production unit is envisaged as a small industrial establishment equipped with modern intermediate tools and equipments. A total of 3,200 primary production units are planned to be set up in a phased manner over a 10 year span. The cost of a unit is estimated between Rs. 1 to 3 lakhs. The investment is to be shared by the beneficiaries, the Corporation and the Banks in the ratio of 10:40:50.

Bamboo Industry

Bamboo and reeds industry employ about 3 lakh persons including indirect employment. Most of the work involved relate to the collection of bamboo and reeds from the forests. 6.2 million Nos. of bamboo are grown on 3,010 hectares of forest plantations in the State. Mat weaving is the primary occupation of the economically and socially weaker section of society. The provision of raw materials and marketing of finished products is dominated by inter mediaries who appropriate a major portion of the fruits of labour of the workers.

To ameliorate the deplorable living conditions of the workers. the Kerala State Bamboo Corporation was set up to ensure effective supply of raw materials and marketing of finished products: About 15,000 weaver families are directly attached to the Corporation. They are engaged by the Corporation in the collection, transportation and delivery of reeds from forests. The Corporation produced 80 lakh square metre of bamboo mats worth Rs. 69.39 lakhs in 1980-81. The principal customers of the corporation are the Food Corporation of India, Central and State Warehousing Corporations, Sugar Mills and Merchants. Bamboo mats worth Rs. 141.68 lakhs were sold in 1980-81. The production of mats is expected to attain the 100 lakh sq. metre target in 1982-83.

The Corporation has initiated a programme costing Rs. 106 lakhs for converting bamboo mats into resin bonded bamboo boards- which will be a substitute for plywood used as panelling/partition material.

Power

The beginning

The State is endowed with an abundance of natural water power resource. A portion of it has already been developed while works are in progress for harnessing resources at some additional sites*. The unique topography of the State and the intensity of rainfall are the favourable factors conducive to the development of hydro electric power. In 1906 the Kannan Devan Hill Produce

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*The State has 41 rivers flowing westwards and three eastwards. Economically exploitable hydel resources are mainly contained in 10 of the west flowing rivers and all 3 east flowing rivers.

Company a firm of European planters owning extensive tea estates and several factories in the High Ranges of Idukki District installed a plant of 2000 K. W. capacity exclusively intended to cater to their industrial and domestic needs. Travancore Government focussed attention in 1918 to the question of harnessing some of the important waterfalls of the State for the purpose of generating power. The Government sanctioned in 1927 a scheme for installation of a thermal station in Trivadrum. The electric supply system was formally switched on in 1929 at Trivandrum and marked the beginning of electricity in the State. A small power station (owned and managed by the State) having 3 oil engine driven generation sets each of 65 K. W. was commissioned which was later dismantled when the first Hydro electric scheme—the Pallivasal Hydro-electric project was commissioned.

The existing power system in Kerala—purely hydro based—consists of nine stations (Pallivasal, Sengulam, Neriamangalam, Panniar, Poringalkuthu, Sholayar, Sabarigiri, Kuttiyadi and Idukki Stage I). With a total installed capacity of 1011.5 MW with an annual generation potential of 4,730 million units from 9 completed projects. The demand projection is that the State would need about 12,000 million units a year by 1989-90. The State has a power potential of 3 Million KW at 60% load factor.

Briefly discussed below are some of the salient features of the Hydro Electric Projects of the State.

1. *Pallivasal Project.*—The Pallivasal Hydro-Electric System commissioned in 1940 was the first scheme developed in the State. The dams have been built across the Mudirapuzha river at its upper reaches, one at Kundala with storage capacity of 1,758.70 Metres and another at Mattupatty 1,599.59 Metres. A barrage built across the river at Munnar diverts the water through a tunnel 3,118 Metres long and then through pipe lines to a Power House situated on the right bank of the river at Pallivasal. A continuous power draft of 240 cusecs and about 510 Metres drop is utilised for power generation. The Power House has an installed capacity of 37,500 K. W

2. *Sengulam Project.*—The Sengulam Hydro-Electric Project commissioned in 1954 utilises the tail water of the Pallivasal Power House over a fall of nearly 366 Metres in the Mudirapuzha river between Pallivasal and Sengulam Power House sites. The water discharged from Pallivasal Power Station and that coming down the river is pumped through a tunnel 1,755 Metres long into a balancing reservoir and then conveyed through another tunnel 1,877 Metres long and two pipe lines each 957 Metres long to

Sengulam Power House located on the right bank of Mudirapuzha river about 9.8 kms. downstream of Pallivasal Power Station. A firm power draft of 260 cusecs is utilised in the Scheme. The power station has an installed capacity of 48,000 K. W.

3. *Neriamangalam Project.*—This is the third project completed in the Mudirapuzha and utilises the last drop of about 198 metres in the river before it reaches the river Periyar. The tail water of the Sengulam Power Station together with the run off of the river flow of about 495 Sq. Kms. of the uncontrolled catchment of the Mudirapuzha below Munnar are being utilised in the Scheme. In addition, about 28.5 sq. kms. of the catchment of upper Kallar (a stream flowing outside Mudirapuzha catchment) are also diverted into the Neriamangalam scheme catchment. The water is diverted by means of a dam across the river at Kallarkutty and led through a tunnel about 3,385 Metres long and three pipe lines each about 468 Metres long to a power house situated on the right bank of Periyar just below the confluence of Mudirapuzha and Periyar. The installed capacity of the station is 45,000 K. W.* The Project was Commissioned in 1961.

4. *Panniar Project.*—The Project commissioned in 1964 utilises the water available from 267 sq. kms. of the Panniar, a tributary of Mudirapuzha regulated by means of the two dams one at Anayirankal with storage capacity of 1,207.01 Metre and the other at Ponmudi with a storage capacity of 707.75 Metres. The water is led through a tunnel about 3,066 metres long taking off from the Ponmudi reservoir and two pipe lines each about 766 metres long to a Power Station on the left bank of Mudirapuzha river opposite to the Sengulam Power Station. A gross head of about 233 metres and 300 cusecs continuous power draft will generate 15,300 K. W. of firm power. The installed capacity of the station is 30,000 K. W.

5. *Poringalkuthu.*—The Poringalkuthu Left Bank Hydro-electric Scheme, one of the four existing Hydro-electric Schemes of the State harnessing the power potential of the Chalakudi basin, is located in Mukundapuram Taluk of the Trichur District. The scheme was first investigated 65 years ago. A number of eminent engineers suggested the present site which provides a drop of 183 metres. The Poringalkuthu Left Bank Scheme is the first hydro-electric scheme in the river basin and the second in Kerala State. It contemplates development of

* Economic Review, Kerala 1969, p. 39.

power from the Chalakudi river in 2 stages. The work on the project was inaugurated as early as 1946. The first stage was the construction of a dam and connected water conductor system and the installation of 3 generators of 8,000 K. W. each. The second stage was the installation of the fourth generator of 8,000 K. W., thus raising the installed capacity of the Power House to 32,000 K. W. A storage dam 26.21 Metres high has been constructed across the Chalakudi river below Anakayam valley, about 45 Kms. east of Chalakudi town. The length of the dam at the top is 366 metres. The water from this reservoir is diverted through a tunnel 1227 metres long and 13.37 sq. metres in sectional area to a power house located on the left bank of the river by penstocks 792.96 metres long with a gross head of 181.36 metres. The catchment area at the dam site is 979 sq. kms. with an average rainfall of 275.8 cms. Water from the penstocks drives the four reaction Francis turbines operating under a gross head of 181.36 metres. Each of the 13,500 H. P. turbines drives a 8,000 K. W. alternator. Four transformers each of 10 MVA-11|66|110 K. W. are provided to step up the voltage for transmission to Chalakudi, thirty-two Kms. away, and from where the supply is connected to the State grid. The civil works connected with the project have been completed. The project was formally inaugurated in May, 1957. 80.72 M. units were generated during 1958-59 of which 80.12 M. units were sent out. The peak load for the period was 21,700 K. W. The fourth generating set of 8,000 K. W. capacity was put into commission in February, 1960 thus completing the Poringalkuthu Left Bank Hydro-electric Scheme. The total cost of the Scheme was Rs. 399 lakhs.

The Poringalkuthu Right Bank Scheme, the third scheme utilising the power potential of Chalakudi river further harnesses the waters of the Chalakudi river by a dam further upstream of the present dam at Anakayam. This scheme has a power potential of 130,000 K. W. at 60% load factor and it costs about Rs. 1,404 lakhs. The power station of this scheme is located almost opposite to the Left Bank power station.

This scheme in general contemplates the development of power from the Chalakudy river with the aid of reservoir constructed in the Chalakudy river where it is joined by Anakayam stream. The power house with an installed capacity of 24.000 K. W. is located down stream of the foot of the Poringalkuthu falls. The expenditure prior to the commencement of the First

Five Year Plan amounted to Rs. 125 lakhs and the expenditure during the Second Plan was Rs. 175.23 lakhs. This project was originally programmed to be completed by the end of the First Five Year Plan. But due to some delay in the supply of penstock and generating plant, the commissioning of the generating plant could be achieved only in the beginning of the Second Plan.

All the three generating sets each of 8000 K. W. were commissioned during the first quarter of 1957-58. This station is now in commercial operation and supplying power to the Kerala grid.

Poringalkuthu II Stage.—The scheme is for the installation of a fourth generating unit of 8000 K. W. in the Poringalkuthu power station. A provision of Rs. 35.41 lakhs was included for the purpose in the Second Five Year Plan.

6. *Sholayar.*—Another Hydro Electric Scheme in execution during the Second Five Year Plan was the Sholayar Hydro Electric Project with a generating capacity of 54,000 K. W. This scheme was the second power project in the Chalakudi river. The scheme envisaged the construction of a dam 45.7 metres high across Sholayar, a pick-up weir 3.2 kms. lower down the river to divert water through a short tunnel of length 366 metres and drop it down through penstocks to a power house to be located on the bank of the Anakayam stream 299.31 metres below. The Anakayam river empties its water into the Chalakudi river at a point 1.6 kms upstream of the present Left Bank Scheme dam site. At the proposed dam site, the Sholayar commands a catchment of 186.48 sq. kms. with an average rainfall of 315 cms.

A 45.72 metres high masonry dam in the Sholayar tributary of the Chalakudy river has been constructed at a place about 2 kms. from Ambalapara to give a storage reservoir of 149.2 MCM. The generating station has 3 generators, each 18,000 K. W. with the necessary transformers and switchgear. Power to the extent of 25,000 K. W. at cent per cent load factor can be generated from this station.

The tail water from this scheme about 380 cusecs flows directly into the Poringalkuthu Left Bank scheme reservoir. This additional flow of water into the reservoir is made use of to develop 15,200 K. W. of additional power at Poringalkuthu left bank station.

7. *Sabarigiri Hydro Electric Project.*—The Sabarigiri Hydro Electrie Project, one of India's major Hydro Electric Projects and the second biggest of its kind to be undertaken in the State, is in the Pathanamthitta District. It was formerly proposed to be implemented in two stages and was known as the Pamba Hydro Electric Project. An integrated Project estimated to cost about Rs. 30.9 crores was approved in August 1960 by the Planning Commission and the State Government decided to name the Project the Sabarigiri Hydro Electric Project after the famous Sabarimala to the south of which the works of the Project are located. The Project envisages the harnessing of the hydro electric potential of the River Pamba and its tributary Kakki. It has an installed capacity of 3 lakhs K. W. of power. The United States Government sanctioned loans to finance the entire anticipated cost of this Project.

Under the Sabarigiri Hydro Electric Project, a dam is constructed at Pamba to impound the waters of the Pamba river and to form a Reservoir. Another Reservoir is formed at Kakki river. These two Reservoirs are inter-connected by a tunnel, which enables the waters of the Pamba Reservoir to flow into the Kakki Reservoir. From the latter another tunnel will carry the water to the head of the Generating Station. The Generating Station is located on the right bank of Moozhiyar, a stream which joins the River Kakkad, which is also a tributary of the Pamba Six numbers of 50,000 K. W. generators are installed at Power House at Moozhiyar. The dam sites, the tunnels and the site for the Power House are all in the Reserve Forest areas of the Ranni Division. The power generated from the Station is transmitted to Pallom (near Kottayam) and Alwaye through a 220 K. V. Line from where it will be distributed to the consumers.

8. *Kuttiyadi.*—The Urakuzhi scheme is the only Hydro Electric Project in the Kozhikode District. The construction of a reservoir above the Urakuzhi falls in the head reaches of the Murat river is a feature of the scheme. The average annual rainfall of the catchment above the proposed dam site, as obtained from a private estate, near Kuttiyadi is 600 cms. The effective storage capacity of the project is 34.0 MCM. The full reservoir level is 758.04 M.

9. *Idukki Hydro-Electric Project.*—The Idukki, Hydro-Electric Project, the biggest of its kind planned in the State, lies in the Idukki District. It is situated across the river

Periyar at the boundary of Udumbanchola Taluk and Thodupuzha Taluk. Designed for an installed capacity of 8 lakh K. W. with five generating sets, it will also provide irrigation benefits to an area of about 50,000 hectares in the Thodupuzha, Meenachil and Vaikom Taluks.

The earliest reference to Idukki Hydro-Electric Development is in the report of an Italian Engineer F. J. Jacob, dated 30th April, 1919 which reads as follows:—"This is on the Periyar river and is about 6 miles above the Mudirapuzha junction (vide Survey of India Sheet No. 58|C|13). The catchment area is about 300 sq. miles and the rainfall about 300 to 400 inches per annum. The vertical drop at the fall is, however, only 30 ft. But from the fall to the Mudirapuzha junction about 6 miles the bed fall is 130 feet per mile on a total of 775 feet, the minimum discharge of the river being about 150 to 180 cusecs". Later another Engineer from Italy, Ing. Angelo Omedeo, investigated the Scheme from the available records and reported that at 385 ft. head and 1,320 cusecs discharge the mean yearly output will be 32,250 K. W. Both suggestions were based on utilising the fall in the course of the Periyar itself and did not contemplate the diversion of the waters to another catchment to obtain a higher fall. The discovery of Idukki dam site is however, associated with the name of W. J. John, Superintendent, Malankara Estate (a planter who had an extraordinary intuition for engineering) who during one of his hunting expeditions, accompanied by Karuvallayam Kolunhen (a hill tribe hunter) in the year 1922, while crossing the river near the V shaped gorge (1870.00 above M. S. L.) between the massive exposed rocky pinnacles, Nellichoramala (2752.00) and Idukki Mala (3033.00) locally known as Kuravan and Kurathi, is said to have been struck by the idea of the construction of a dam at Idukki. He brought to the notice of the Government the importance of the place so far as its utility for power development was concerned. Periyar has carved for itself at Idukki a deep and narrow gorge out of the unspoilt hard granite rock without faults or fissures. The site is about 56 km. downstream of the existing Mullapperiyar Dam and about 3 kms. upstream of the confluence of Periyar and Cheruthoni. A relatively small wedge at this spot will create a huge reservoir ringed by the high hills. The valleys of Cheruthoni and Periyar at the upper reaches of the dam sites are so shaped that a given height of the dam will create perhaps the most capacious artificial lake in the Western Ghats with a water

spread of 54 sq. kms. The idea that lay buried in the files for about a quarter of a century was taken up for detailed investigation in 1957 by the Central Water and Power Commission.

Idukki power development centres round three dams—the main dam across Idukki, another spillway dam across Cheruthoni and a third flanking dam at Kulamavu to form a combined reservoir with an effective storage of 1671 MCM. The water from the lake is diverted towards the west through a tunnel extending up to the Nadugani hills whence penstock pipes will lead them to a Power House at the foot of the Nadugani hills at Moolamattom for generating power and flow into Nachar in the Moovattupuzha basin. There is also the possibility of producing more power from the same generating stations by diverting the water from some neighbouring catchments to Idukki reservoir and these proposals are under investigation.

The Idukki tail water will irrigate about 50,000 hectares of land lying in the Thodupuzha, Moovattupuzha, Kanayannur, Meenachil, Kottayam and Vaikom Taluks. 20,000 hectares of low-lying Kari lands in the Vaikom, Kottayam and Kanayannur Taluks will be immensely benefitted due to the fresh water supply and will be relieved from the danger of salinity to ensure two stable crops.

The concrete arch dam at Idukki gorge has a length along the axis of 384 metres with F R. L. at 2,385 above M. S. L. height above deepest foundation of 165 metres and a maximum base width of 66.14 metres. The width of the river at the bed is only 10.67 metres.

The Cheruthoni dam located about 2.4 kms. upstream of the confluence of Cheruthoni and Periyar will be of straight solid gravity type with masonry, having top length of 593.72 metres and height above deepest foundation of 128 metres. Spillway for the safe discharge of flood waters is located in this dam and the downstream face at one flank is curved to conform to the flow of water.

The auxiliary dam is in a streamlet called Kilivalli thodu near Kulamavu and will be rolled fill type 75 metres high and of length 325 metres.

Water from the storage reservoir is conveyed to the Surge tank located at the western slope of the Nadugani Hill through

a tunnel length 6.4 kms starting from Sevagan thodu and dia.' 6.6 metres designed for a peak discharge of 4,800 cusecs. From the Surge Tank 4 low pressure steel lined tunnels, lead the water to the valve house and then each low pressure tunnel bifurcates at the valve house to form 8 numbers penstocks aligned down surface slopes to the power house at the foot of the hill. The floor level of the power house will be 194 above M. S. L. Eight generating units of 100 M. W. each are installed for the ultimate generation of 800 M. W. under 30% load factor.

Till March 1983, the total investment in Kerala's Power Sector was Rs. 642.25 crores which accounts for 24.9% of the total plan expenditure of the State. The date on investment on power development in the State during the plan periods are given in Appendix I, and growth of power system in Kerala in Appendix VII

Generation Projects

The power generation potential created as a result of the completed power projects in the State and the actual generation of power during 1984-85 are given in Appendix II. The following power generation schemes were in various stages of execution in the State in 1982-83.

A. On-going Schemes

1. *Idamalayar.*—The Idamalayar Project in the Periyar basin envisages construction of a masonry dam 90 m. high, a power tunnel 1730 m. long, two penstocks 165m. long each leading to a power house with two generating units of 37.5 M. W. with an equivalent energy of 320 MU per annum. When the scheme was started the estimated cost of it was Rs. 50 crores. The assessed cost of the scheme was Rs. 89 crores (1982) of which Rs. 29.15 crores was apportioned to irrigation and other water uses, the power portion being Rs. 59.85 crores. In 1982-83, Rs. 9.33 crores was spent on this scheme. Till March 1983 Rs. 56 crores had been spent on the scheme. It was expected that two units of the power station can be commissioned by May/June 1986.

2. *Idukki Stage III.*—The scheme is intended for pooling of more water into the Idukki reservoir by diversion of water from Kallar and Erattayar. The Kallar diversion system mainly consists of a masonry gravity dam 12.2 m. high across

Kallar and an unlined tunnel 2.96 km. long and 5 m. dia. to divert the waters from Kallar to Erattayar. The Erattayar system comprises a masonry gravity dam 19.8 m. high across Erattayar and an unlined tunnel 3.8 km. long and 6 m. dia. to divert the waters from Erattayar to Idukki reservoir. The scheme will yield an additional energy of 376 MU annually at Idukki.

The estimated cost of the project is Rs. 11.76 crores. An amount of Rs. 9.71 crores has been spent on the project till March 1983. The project was to have been commissioned in 1981-82 but certain problem resulted in slippage. The 2905 m. long Kallar Erattayar tunnel is already through; construction of the Kallar dam is also progressing and about 55% of the work is over.

3. *Sabarigiri Augmentation Scheme.*—The Sabarigiri Augmentation Scheme contemplates diversion of waters of Kallar, Gaviar and Meenar streams into the existing Pamba reservoir and the waters of upper Muzhiar into the existing Kakki reservoir. The average annual yield available from diversion will be 2.7 T. M. C. which when pooled in Sabarigiri reservoir will yield 14.5 MW corresponding to 130 MU per annum at the Sabarigiri power house. The scheme was started with an estimated cost of Rs. 3.23 crores. The assessed cost of the project was Rs. 6.34 crores in 1980. The expenditure till March 1983 on the project was Rs. 4.47 crores.

4. *Kakkad Hydro-Electric Scheme.*—Kakkad project is a tailrace development of existing Sabarigiri Power Station in Pamba. The scheme comprises of two dams 32 M. high, an unlined inter connection tunnel 2900 m. long, a power tunnel 7500 m. long and pressure shaft 360 m. long to lead the tailrace water of Sabarigiri Power Station to Kakkad Power Station. This would add 30 MW of firm power to the existing system.

The project was sanctioned in 1976 with an estimated cost of Rs. 18.60 crores. The assessed cost of the project is Rs. 37.60 crores. The expenditure up to the end of March 1983 was Rs. 6.7 crores.

5. *Idukki Stage II.*—This project is for installation and commissioning of 3 additional units 130 MW capacity each at the existing Idukki Power Station. The project was sanctioned in 1979 estimated to cost Rs. 31.68 crores. The assessed cost of the scheme is Rs. 80 crores. The expenditure on the project upto March 1983 was Rs. 3.84 crores.

6. *Kallada.*—This scheme includes installation of two units of 27.5 MW each to generate 65 MU of energy per annum. This is a low head scheme with a dam toe power station in the ongoing irrigation scheme. The estimated cost of the project was Rs. 11.80 crores. Preliminary and enabling works on the scheme are almost completed.

7. *Lower Periyar.*—Lower Periyar Project is a tailrace development just below the Neriamangalam Power Station. The scheme has been given techno-economic clearance by the Central Electrical Authority and ecological clearance by the Department of Science and Technology. The Planning Commission has also cleared the project. Estimated cost of the project is Rs. 100.50 crores. The installed capacity is 180 MW and the project will contribute about 500 million units of firm energy annually.

New Schemes

1. *Pooyamkutty.*—The biggest of the new schemes is a network with a total capacity of 750 MW. Six dams will have to be built to harness the waters of a number of rivers and streams apart from the Pooyamkutty river itself. One of the dams will be across the Anamalayar.

2. *Mananthody.*—The project seeks to use Kerala's share of the Cauvery water. Its usefulness lies in that, it would help stabilise power supply in the northern region, and partially alter the imbalance in the State's power system of heavy concentration of generating capacity in the southern region. The installed capacity of the project is 240 MW.

3 *Munnar Project (240 MW).*—Aims at replacing the Pallivasal project the first to be started in the State and after having been operated for four decades in a state of dubious safety. Sub surface disturbances and landslides have displaced the penstock pipes and the plant will have to be abandoned sooner than later. The new power house will be located 300 metres underground in the Nagamala hills at the junction of Alwaye-Munnar and Chithirapuram roads. The project will add 800 million units of power annually to the State's supply.

4. *Other Schemes.*—During the Seventh Plan period, the other schemes proposed include Kuriarkutty—Karappara (95 MW), Pandiyar Punnapuzha (70 MW), Cholettipuzha (60 MW), Adirappally (75 MW), Kuttiadi augmentation and about half a dozen mini projects.

Transmission

In 1982-83 about 91.6 ct. km. of 110 KV lines, 140.04 ct. kms. of 66 KV lines, 361.3 ct. kms. of 11 KV lines and 3056.8 ct. kms. of LT lines had been added to the State's power system, 4 E. H. T. sub-stations were also opened.

Distribution and Rural Electrification

All the revenue villages in the State have been provided with electricity by 1979-80. However a number of *Karas* in these villages are still without electricity. Provision of electrical lines in some of these Karas has been taken up with financial aid from Rural Electrification Corporation. Major achievements in this area are given below.

	Numbers
Service connections given	71.418
Street lights installed	12,106
Agricultural pumpsets energised	14,178
Harijan and tribal colonies Electrified	384

The district-wise distribution of pumpsets energised during the year 1984-85 is given in Appendix VII.

The Kerala State Electricity Board

Initially Electric supply was done under the Indian Electricity Act 1910, which regulated the work. The generation and distribution was in the hands of private licensees, local bodies and State Department of Electricity. The Electricity (Supply) Act of 1948 replaced this system. The Act had as its objective rationalisation of power development at the state level by the State Electricity Boards which were to be established as autonomous corporate bodies in the public sector under the Act. The Act also envisaged the formation of the Central Electricity Authority to frame the overall power development policy and co-ordination at the national levels. The Kerala State Electricity Board was established on 31st March 1957. The capital of the Board consists of loans from the Government, market borrowings and loans from financial institutions supplemented by the internal resources.

The gamut of electricity supply in the State is the responsibility of the Electricity Board. This involves wide ranging activities such as investigation, construction of power projects, generation, transmission and distribution of power.

APPENDIX I

Details of Investment on Power Development

(Rs. in lakhs)

Period	*Generation*	*Transmission and Distribution*	*Rural Electrification and others*	*Total*
Upto 1-4-1957	2,337.31	109.95	45.47	2,492.73
II Plan	883.82	798.68	258.18	1,949.68
III Plan	4,750.51	1,084.47	235.00	6,069.48
Annual Plan (1966-67 to 1968-69)	2,857.07	1,280.64	49.98	4,187.69
IV plan	6,676.33	4,667.20	500.19	11,843.72
V Plan (1974-75 to 1977-78)	6,162.26	4,757.31	1,135.56	12,055.13
1978-79	964.74	2,243.34	86.73	3,294.81
1979-80	753.38	3,372.98	148.79	4,274.15
1980-81	1,280.00	5,011.00	261.00	6,552.00
1981-82	2,115.00	4,166.00	410.00	6,691.00
Total till 3/83	30,674.92	29,984.57	3,565.90	64,225.39
1983-84 (Anticipated Expenditure)	4,058.00	2,767.00	783.00	7,608.00

APPENDIX II

Power Projects and Power Generation Capacity (1984-85)

Project	*Installed Capacity in MW*	*Energy potential Mkwh.*	*Units generated Mkwh.*
1. Pallivasal	37.5	284	235.9391
2. Sengulam	48.0	182	149.8630
3. Neriamangalam	45.0	237	289.9000
4. Panniar	30.0	148	108.9860
5. Poringalkuthu	32.0	170	237.3511
6. Sholayar	54.0	233	277.7817
7. Sabarigiri	300.0	1,213	1,374.9200
8. Kuttiadi	75.0	248	272.8070
9. Idukki	390.0	2,015	1,937.3800
Total	1,011.5	4,730	4,884.9279

APPENDIX III

Power Generation

(Cost escalation of Selected Projects)

(Rs. in lakhs)

Sl. No.	Name of Scheme	Year of starting	Original estimates	Latest estimated cost	Expenditure upto 3/85 (anticipated)	Expected year of completion	Increase in the original cost %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Power Generation						
1	Idamalayar	1970	2,340	5,985	5,226	1985-86	256
2	Idukki Stage I	1976	410	1,176	1,128	1986-87	287
3	Sabarigiri Augmentation	1972	128	634	586	1985-86	495
4	Sabarigiri VI Unit replacement	..	..	323	100		
5	Idukki Stage II	1980	3,168	8,000	5,453	1985-86& 1986-87	253
6	Kakkad	1976	1,860	4,117	1,295	1986& 1988	223
7	Kallada	1981	1,180	1, 180	99	1989	..
8	Lower Periyar	1983	8,843	10,050	539	1990	119

APPENDIX IV

Total Quantity of Power sold and the receipts by the sale of Electricity

Particulars	1984-85		
	Power sold in Mkwh.	*Income (Rs.lakh)*	*Average per Kwh.*
1. Domestic lights, fans and small power	800	2,476	30.95
2. Commercial lights, fans and small power	260	1,739	66.86
3. *Industrial*:			
(a) Low and Medium Voltage	225	604	26.86
(b) High Voltage and EHV	1,835	4,030	21.96
4. Public Lighting	46	646	140.37
5. Irrigation—Agricultural De-watering	92	164	17.82
6. Public Water Works and sewage pumping	37	103	27.95
7. Bulk Supply (Licensees)	81	98	12.17
8. Total sales to neighbouring States	329	1,231	37.42
9. Additional Revenue on account of Tariff revision	..	4,385	..

APPENDIX V

Consumption of Power and Revenue Collected (Internal) 1984-85

Category	No. of consumers as on 31-3-1985	Connected load as on 31-3-1985 KW	Energy consumed Million KWH	Energy consumed Percentage to total	Revenue collected Provisional Rs. lakh.	Revenue collected Percentage to total
1. Domestic lights fans and small power	1603138	1130000	800	23.7	2476	15.11
2. Commercial lights, fans, Heat & Small power	361597	273000	260	7.7	1739	17.64
3. Industrial (Low and Medium Voltage)	40530	466000	225	6.66	604	6.13
4. Industrial (High and Extra High Voltage)	468	482000	1835	54.35	4030	40.87
5. Irrigation	117549	345000	92	2.73	164	1.67
6. Public lighting	1398	24500	46	1.36	646	6.55
7. Water Works and sewage pumping	686	17000	37	1.10	103	1.04
8. Bulk supply to Licensees	5	65000	81	2.40	98	0.99
Total	2125371	2802500	3376	100	9860	100

APPENDIX VI

Growth of Kerala Power System at a glance

Particulars	As on 31-3-1985
1. Installed capacity—MW	1,011.5
2. Maximum demand—MW	
(a) System	939.8
(b) Internal	911
3. Generator per annum—MU	4,884.93
4. Import per annum—MU	123.52
5. Export per annum—MU	356
6. Energy sales per annum—MU	3,705
7. Energy losses as percentage of energy available for sale	25%
8. Per capita consumption—KWH	129.49
9. 220 KV lines—Ct. Km.	887.3
10. 110 KV lines—Ct. Km.	1,796.37
11. 66 KV lines—Ct. Km.	2,332.03
12. 11 KV lines—Ct. Km.	16,316.62

13.	LT lines—Ct. Km.	71,258.7
14.	Step up transformer capacity—MVA	1,198
15.	No. of EHT sub stations	108
16	Step down transformer capacity—MVA	3,772.6
17.	Distribution transformer	
	(a) Nos.	12,597
	(b) Capacity—KVA	1,336,539
18.	No. of villages electrified /No. of villages	1,268 1,268
19.	No. of consumers	2,125,571
20.	Connected load—MW	2,802.5
21.	No. of street lights	452,179
22.	No. of irrigation pumps	131,991
23.	Total revenue per annum (Rs. lakhs.)	13,633

APPENDIX VII

Pumpsets Energised (District-wise)

District	As on 31-3-1985
1. Trivandrum	3,350
2. Quilon	1,246
3. Alleppey	951
4. Kottayam	4,401
5. Idukki	2,321
6. Ernakulam	21,023
7. Trichur	62,653
8. Palghat	16,768
9. Malappuram	7,845
10. Kozhikode	2,040
11. Cannanore	3,787
12. Wynad	483
13. Pathanamthitta	464
14. Kasargod	4,559
Total	131,891

Mineral Sands

The coastal tract in Quilon and Alleppey districts along Chavara-Neendakara area and upto Kayamkulam is endowed with large deposits of mineral sands, occurring as beach placers containing ilmenite, rutile, monazite, zircon, sillimanite, leucoxene, garnet, etc.

Mineral based Industries

Travancore Titanium Products Ltd.[1]. -The Travancore Titanium Products Ltd., manufactures Titanium Dioxide Pigment mainly of anatase grade, using Ilmenite and Sulphuric acid. The conversion of the existing Sulphuric acid plant into DCDA system has been completed by Travancore Titanium Products with a view to minimizing the atmospheric pollution and increasing the capacity of the plant from 300 to 450 tonnes per day. Together with the capacity of the existing 50 tonnes per day plant, this will increase the production of sulphuric acid to 500 tonnes per day i.e., 15,000 tonnes per annum. Even at the full capacity of existing titanium dioxide plant, the captive consumption will be only about 300 tonnes per day and therefore the Travancore Titanium Products will be capable of catering to the needs of sulphuric acid by other industries in the State to the extent of 100 to 150 tonnes per day.

The Kerala Minerals and Metals Ltd.—A titanium dioxide pigment project is being set up for the manufacture of Rutile grade Titanium dioxide pigments with a capacity of 22,000 tonnes per annum. The project consists of three main plants, namely Ilmenite Beneficiation Plant, Hydrochloric Acid Regeneration Plant and Pigment Production Plant besides other utility plants such as boiler, oxygen plant, water treatment plant, etc. The total cost of the project is estimated to be Rs. 86 crores of which Rs. 27 crores will be by way of equity from Government of Kerala and Rs. 59 crores by way of term loans from All India Financial Institutions and Banks. The project was commissioned during 1984-85. The anticipated export from the Titanium Dioxide pigment project is Rs. 7.8 crores per annum. The Kerala Minerals and Metals Ltd., produced 1459 MT of rutile grade titanium dioxide worth Rs. 473.70 lakhs, in its new plant at Chavara, commissioned in January, 1985. This accounted for 71.95 per cent of the total value of goods produced

[1] Refer page 378 of the Trivandrum District Gazetteer for the early history and developmental phases.

by the Company during 1984-85. This has contributed significantly to the substantial increase in total sales turn over of the Company. The Company achieved a higher rate of capacity utilisation in respect of its two major products viz., ilmenite and rutile, at 80.39 per cent and 74.17 per cent respectively.

Clays

The State possesses enormous resources of china clay. Clays of sedimentary and residual origin have been known to occur predominantly in the districts of Trivandrum, Quilon and Cannanore. Ernakulam, Alleppey, Trichur, Malappuram and Kozhikode districts also are known for minor occurrence of clays. The Department of Mining and Geology has carried out surveys for locating clay deposits in various parts of the State and total reserve of 72 million tonnes of china clays has been estimated mostly inferred on the basis of the preliminary work. Besides, 1.67 million tonnes of ball clay have been estimated in Trivandrum, Quilon, Alleppey and Cannanore districts.

The best known deposits of china clays are at Kundara in Quilon district which are exploited by M|s. Kerala Ceramics Ltd.

The Chalakudy Refractories Ltd.—A hand-out issued by the Chalakudy Potteries Ltd., in 1971 briefly traces out the history of the Company thus:

"Proliferation of tile factories in the old Cochin State about half a century ago may have prompted the then Maharaja of Cochin to conceive in a big way the "Government Stoneware Works", a ceramic industry to manufacture stoneware pipes. The cheap transport facilities for bringing firewood from the Western Ghats through the well-established tramway lines in 1920s may be one of the reasons for locating this industry at Chalakudy by the then Government. In 1921 the foundation stone of the factory was laid by Sri Vijaya Raghavachari, the then Diwan of Cochin.

The design, supervision and management of the "Government Stoneware Works" was first entrusted with a foreign expert by name J. F. Kuneheil. After the completion of the establishment of the factory he left the Cochin Government Service in 1924. Then another expert from Coorg, Sri Balappa took over charge of production for two years. The factory was run directly by Government till 1939 during which period

an English Expert by name C. H. Whatmore was also employed for five years as Manager of the factory. Till 1932 Stoneware Pipes and Bricks were the main products. Diversification of production viz., manufacture of jars, etc., started during Whatmore's time. In 1939 this factory was handed over on lease to a private concern The General Mercantile Corporation Ltd., which was running the factory in the style and name 'Cochin Potteries'. This Company was producing the famous Cochin Brand Jars which had an appreciable market throughout India. These jars were cheap and stood first in quality. Raw materials for the manufacture of these items were brought from Cuddapah and other places. About 250 workers were directly employed by the General Mercantile Corporation in the beginning thereby giving employment to about 1000 others indirectly.

"The boiler and other machineries erected at the time of the establishment of the Company were being used till its closure in 1965. No attempt was made by the lessees either to improve the age-old obsolete machineries or to erect new machineries in tune with the latest production techniques. It will be surprising, if stated that even in 1960s no electricity was made use of in the line of production. After the General Mercantile Corporation the assets were again given on lease to some other parties but none of them were successful as they were not in a position to improve the methods of production by using improved techniques. As a result the Company had to be liquidated and closed".

The Chalakudy Potteries Ltd., was incorporated on 15th March 1969 as a public limited company to rehabilitate the workers thrown out of employment following the liquidation and closure in 1965 of the Cochin Potteries owned by the Government. This Company had taken on lease the assets of the Government owned factory, valued at Rs. 7 lakhs, and had initiated steps to renovate the buildings completely and to replace the old machineries of the Cochin Potteries on up-to-date lines and to revive the industry which had a place of pride in the old Cochin State, especially for the people of Chalakudy.

The Company proposed to manufacture initially, hard pressed flooring tiles and various kinds of refractories. These items had a very good market not only in South India but also in other States like Maharashtra. Locally available clay

for the manufacture of flooring tiles and fire clay from Kalamassery and Alwaye areas for refractories were to be made use of. Firewood was expected to be obtained from the Forest Department. With the completion of that scheme, estimated to cost Rs. 7.5 lakhs excluding the cost of the assets taken on lease, the annual turnover of the factory on full production was expected to cross Rs. 11 lakhs.

Production of the Chalakudy Potteries Ltd., was inaugurated on the 14th August 1971. But in the absence of proper equipment, quality control or process control procedures, the unit was making only ordinary pouring sets and refractory bricks of uncertain quality.

During the year 1971-72 the Company's production was to the extent of 800 tonnes only, and its sales during that year amounted to about Rs. 0.45 lakh. Though production picked up subsequently, the unit could not achieve at least 50 per cent of its installed capacity of about 5000 tonnes per annum. Problems of marketing the products, being below the standard speifications, and of getting firewood at competitive rates were mainly responsible for the low capacity utilisation. The Company was thus running at a loss.

The Company approached the Government for help in modernising the factory. Accordingly, Government asked KSIDC to help the unit in its modernisation.

KSIDC conducted a detailed market survey for special refractory products in Kerala, Tamil Nadu and Karnataka, and prepared a detailed project report for a scheme of expansion-cum-diversification for the company for expeditious implementation. This scheme costing about Rs. 82 lakhs was approved by the Government, and the Company started implementing the scheme with share capital assistance from the Government, and loan assistance from KSIDC and the Kerala Financial Corporation.

The name of the Company was changed to the Chalakudy Refractories Ltd., with effect from 12th July 1978.

The Kerala Ceramics Ltd., Kundara.—The Kerala Ceramics Ltd., Kundara, Quilon has been incorporated as a subsidiary of the Kerala State Industrial Enterprises Ltd., on November 1, 1963. The Company has three operating divisions viz., (1) Porcelain Division, (2) Kaolin Division, (3) Sanitaryware Division.

Porcelain Division is manufacturing Porcelain Tablewares and Low Tension Insulators and other electrical and industrial porcelain items.

Kaolin Division is engaged in production of Spray Dried Kaolin (Paper Coating Clay) and Ceramic Grade Clay to cater to paper, paints and pesticides Industries. Sanitaryware Division proposes to manufacture sanitarywares in collaboration with Neyveli Ceramics Ltd. This Unit was taken over from SIDECO which was formerly operating as a service centre for ceramics enterprises. The authorised capital of the Company is Rs. 2 crores divided into 20 lakhs equity shares of Rs. 10 each. The paid up capital as on 31-3-1985 amounted to Rs. 190.58 lakhs. Man-power as on 31-3-1985 was as follows:

1.	Workers	400
2.	Lower Categories	119
3.	Middle level Executives	18
4.	Executives	8
		548

Large and Small Scale Industries

Thirty-nine industrial units were registered during the first half of this century. Fertilisers and Chemicals, Travancore in Alwaye was the first fertiliser factory in India producing nitrogenous fertiliser. It employed a unique process of wood gasification not found elsewhere. Other important units commissioned during this period included the Rare Earths Division of Indian Rare Earths in the Central Sector, Travancore Sugars and Chemicals Ltd., Kerala Ceramics Ltd., Forest Industries Ltd., United Electrical Industries Ltd., etc., which are now in the State sector and the Travancore Electro Chemical Industries Ltd., Travancore Rayons Ltd., Aluminium Industries Ltd., Laxmi Starch Ltd., Travancore Cements Ltd., Indian Aluminium Co., Ltd., Western India Plywoods Ltd., etc., in the private sector[1].

[1] The District Gazetteers contain further details about the functioning of these industrial ventures.

Industrialisation during successive Plan

Kerala State was formed on November 1, 1956, which incidentally was the first year of the Second Year Plan (1956-61). Planned industrial development may be stated to have started during this period, when the Alwaye Unit of Hindustan Insecticides Ltd., in the Central Sector commenced production. The State sector saw the setting up of Pallathra Bricks & Tiles and Traco Cable Company. The Cannanore Spinning Mills, Cannanore, Mannam Sugar Mills Co-operative, Pandalam in the Co-operative Sector and, the Ruby Rubber Works Ltd., Changanacherry, Chakolas Spinning & Weaving Mills, Ernakulam, Premier Tyres Ltd., Kalamassery were some of the noteworthy industrial units incorporated during this period. Industrialisation gathered momentum in the subsequent plan periods.

TABLE 1

Large and Medium Scale Industries in Kerala—Plan-wise distribution (Numbers)

Period	*Central Sector*		*State Sector*		*Joint Sector*		*Co-operative Sector*		*Private Sector*		*Total*	
	Existing	*Under Implementation*	*Existing*	*Under implementation*	*Existing*	*Under Implementation*	*Existing*	*Under Implementation*	*Existing*	*Under Implementation*	*Existing*	*Under Implementation*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Pre-plan Period	7	—	6	—	..	..	..	..	26	..	39	..
First Five Year Plan (1951-56)	1	—	2	..	..	..	..	..	4	..	7	..
Second Five Year Plan (1956-61)	3	1	2	..	..	..	3	..	5	..	13	1
Third Five Year Plan (1961-66)	4		10						23		37	1
Annual Plans (1966-69)	—	—	..	..	..	..	..	..	5	..	5	..
Fourth Five Year Plan (1969-74)	2	—	5	..	2	..	3	..	15	..	27	..
Fifth Five Year Plan (1974-78)	—	..	10	2	7	1	1	1	8	1	26	5
Annual Plans (1978-80)	—	—	3	1	..	1	..	..	4	..	7	2
Sixth Five Year Plan (1980-85)	—	—	..	..	..	..	..	..	..	..	..	..
First Three Years (1980-83)	—	..	..	3	2	10	..	..	..	12	2	25
Total	17	1	38	6	11	13	7	1	90	13	163	34

Source: S & P Division of Kerala State Industrial Development Corporation Ltd.

Note: (i) The Chronological Distribution is based on date of incorporation of the Units.

(ii) The number of Companies under implementation is tentative

Commencing from 1960-61, a structural variation in the State's economic system could be discerned. This is in keeping with changes in the national economic set up.

Sectoral contribution of Net Domestic Product per cent (At current prices)

Sector	Kerala			India		
	1960-61	1970-71	1980-81	1960-61	1970-71	1980-81
1. Primary Sector	56.0	51.8	44.2	52.2	50.1	39.9
2. Secondary Sector	15.2	17.1	22.2	19.1	19.7	23.0
(a) Of which Manufacturing	12.5	13.1	16.8	13.9	13.4	16.6
(i) Registered	6.2	5.9	8.7	8.0	8.3	10.5
(ii) Unregistered	6.3	7.2	8.1	5.9	5.1	6.1
3. Tertiary Sector	28.8	31.1	33.6	28.7	30.2	37.1
4. Total: Net Domestic Product	100.0	100.0	100.0	100.0	100.0	100.0

The primary sector in Kerala accounted for a higher percentage of the State income of the net domestic product. (44.2% in 1980-81 as against the all India average of 39.9%). Industrial production during the decade of 1970-71 to 1980-81 increased by 87% at an average newly compounded rate of 6.45%. The highest annual rate of growth of 13.82% was recorded in the manufacture of metal products and parts followed by 11.5% in non-metallic mineral production. Manufacture of chemical, chemical products, basic metals and alloys, food products, rubber, plastics, petroleum and coal products, wood, silk and synthetic fibre textiles and machineries and machine tools and registered annual growth rate of above 5%. Wood and wood based products including furniture and fixtures registered annual growth rate around 2.7%. In the case of cotton textile and electrical machinery and appliances the per annum growth rate was 1.6%. Manufacture of textile products and manufacture of paper and paper products showed a decline. Table shows the section-wise growth of industrial production during this period.

TABLE 2

Growth of Industrial Production in Kerala during the Seventies

	Industry	*Growth during the decade 1970-71 to 1980-81*	*Annual Average Growth rate (Compound)*
1.	Manufacture of Food products	66.10	5.20
2.	Manufacture of cotton textiles	16.99	1.58
3.	Manufacture of Wood, Silk and Synthetic Fibre Textiles	64.73	5.14
4.	Manufacture of Textiles products including Weaving Apparel, other than Foot-wear	(–)41.25	..
5.	Manufacture of Wood and Wood products and Fixtures and Furniture	30.02	2.65
6.	Manufacture of Paper and paper products	(–)2.19	..
7.	Manufacture of Rubber, Plastic, Petroleum and Coal Products	74.42	5.69
8.	Manufacture of Chemical and Chemical Products (except products of Petroleum and coal)	131.47	8.73
9.	Manufacture of Non-metallic Mineral Product.	197.10	11.50
10.	Manufacture of Basic Metal and Alloys	72.40	5.57
11.	Manufacture of Metal Products and Parts except Machinery and Transport Equipment	264.5	13.82
12.	Manufacture of machinery, machine tools and parts (except electrical machinery)	77.68	5.93
13.	Manufacture of Electrical Machinery, Apparatus Appliance, Supplies and Parts	16.62	1.58
14.	Manufacture of Transport Equipment Parts	30.26	2.66
15.	Other Manufacturing Industries	48.77	4.07
16.	Electricity	169.66	10.44
	Total	87.10	6.45

The total public sector investment in India was Rs. 38,848 crores on 1st April, 1984. Of this Kerala's share is a meagre Rs. 715 crores— 1.8% — a tiny drop in a mighty ocean. The State-wise investment in the central public sector is given below:

	State	*Value of property (Rs. in Crores)*	*Percentage*
1.	Andhra Pradesh	3,087	7.95
2.	Assam	1,930	4.97
3.	Bihar	5,152	13.26
4.	Gujarat	1,512	3.89
5.	Haryana	361	0.93
6.	Himachal Pradesh	175	0.45
7.	Karnataka	1,199	3.09
8.	Kerala	715	1.84
9.	Madhya Pradesh	4,511	11.61
10.	Maharashtra	5,918	15.23
11.	Orissa	2,165	5.57
12.	Punjab	537	1.38
13.	Rajasthan	643	1.66
14.	Tamil Nadu	2,127	5.48
15.	Uttar Pradesh	2,094	5.39
16.	West Bengal	2,910	7.49
17.	Jammu and Kashmir	28	0.07
18.	Delhi	1,019	2.62
19.	Goa	14	0.04
20.	Other States/Union Territories		0.75
21.	Unallocated	2,459	6.33
	Total	38,848	100.00

Source: A Statistical Review of Central Government Enterprises; Centre for Monitoring Indian Economy, Bombay.

Reviewed below are the salient features of the major industries in Kerala, which are for convenience grouped into four viz., Agro and Forest based industries, Marine based industries, chemical industries and engineering industries. Besides these there are also the traditional industries and mineral based industries which are dealt with separately.

Agro and Forest based industries

Kerala continues to be a predominantly agrarian State. About 44 per cent of the State income is accounted for by the primary sector consisting of agriculture, forestry and logging, fishing and mining. According to 1981 census, about 51 per cent of the total labour force is engaged in primary producing activities. The scenario of existing agro-based and forest-based industries is discussed in this Chapter.

Agro-based Industries

There are 30 existing industrial units in the large and medium sector based on outputs of Agriculture and allied sectors and 4 units under implementation. The total investment of the existing units is Rs. 92 crores and these units together employ 7,863 persons. The estimated annual turnover of these industries is around Rs. 153 crores. The total estimated cost of the units under implementation is Rs. 16.72 crores with an employment potential for 660 persons.

The public sector industries in this group, both Central and State sectors combined account for only 7.2 per cent of the total investment, 6,7 per cent of the turnover and 18.3 per cent of the employment. There are four units in the co-operative sector, with a total investment of Rs. 677 lakhs and an annual turnover of Rs. 1,737 lakhs. With 7.4 per cent of the total investment and 11.4 per cent of the turnover, these units account for 17.5 per cent of the total employment in the agro-based large and medium industries in the State. About two- thirds of the number of agro-based industries in the large and medium sector are in the private sector. These private sector industries account for 84 per cent of the total investment and 81 percent of the turnover, but only 62 per cent of the total employment. Premier Tyres Ltd., and Apollo Tyres Ltd., are the two large scale rubber factories in the private sector Another unit viz., M.M. Rubber Company Ltd., Tiruvella is under implementation. The aggregate picture of agro-based industries based on ownership pattern is given in table 3. Which provides the list of agro-based industries in the Large and Medium Sector with gross block, investment, turnover and employment.

TABLE 3

Agro Based Industries in the Large and Medium Sector as on April 1983

(Including Rubber based and Food Processing)

(*Rs. in lakhs*)

Name of Company	*Gross Block*	*Total Investment*	*Approximate Turnover*	*Employment Nos.*	*Line of Production*
(1)	(2)	(3)	(4)	(5)	(6)
Central Sector:					
1. Modern Food Industries (India) Ltd., Edappally	81	96	350	200	Bread & Bun
	81	96	350	200	
State Sector:					
1. Travancore Sugars and Chemicals Ltd. Thiruvalla	100	145	254	682	Sugar, spirit, Potable liquor.
2. Foam Mattings (India) Ltd., Alleppey	160	200	100	260	Foam Mattings.
3. Meat Products of India Ltd., Koothattukulam	21	25	22	65	Meat Products
4. Trivandrum Rubber Works Ltd., Chackai	199	197	291	232	Bicycle tyres, tubes, rims, camel back.
Total	400	567	667	1239	
Units under implementation:					
1. Meat Processing Plant, Chalakudy	..	600	..	350	Buffalo meat
	..	600	..	350	

Joint Sector:					
1. Vanjinad Leathers Ltd., Kuttipuram	134	148	80	141	Finished Leathers
	134	148	80	141	
Units under Implementation:					
1. Ponmudi Teapacks Ltd., Mattanchery	..	72	..	40	Tea bags
2. K.T.C. Tyres (India) Ltd., Malappuram	..	650	..	200	Tyres & Tubes for Autorickshaws, Scooters, flaps for trucks, buses, etc.
Total	..	722	..	240	
Co-operative Sector:					
1. Mannam Sugar Mills Co-operatives, Ltd., Pandalam.	125	321	155	543	White crystal sugar
2. Kerala Dinesh, Beedi Workers, Central Co-operative Society Ltd., Cannanore.	15	56	1162	104	Beedi
3. Sri E. John Jacob Memorial Modern Rice Mills, Kuttanad.	24	35	25	36	Rice milling.
4. Co-operative Sugars Ltd., Chittur	235	265	395	691	Sugar, rectified Spirit.
Total	399	677	1737	1374	
Private Sector:					
1. Ruby Rubber Works Ltd., Changanacherry	58	149	344	439	Bicycle Tyres and Tubes.
2. Laxmi Starch Ltd., Kundara	362	770	1030	323	Starch and allied products, glucose
3. Premier Tyres Ltd., Kalamassery	1242	2241	6277	1300	Automotive tyres & tubes, camel back.
4. Kerala Wheat Flour Roller Mills Ltd., West Hill.	34	50	159	160	Wheat flour

(1)	(2)	(3)	(4)	(5)	(6)
5. Khemka Flour Mills Pvt. Ltd., West Hill	27	39	30	91	Wheat Products
6. Kerala Solvent Extractions Ltd., Irinjalakuda	83	127	601	235	Coconut Oil & Oil cake, Cattle feed.
7. Tapioca Products Ltd., Chalakudy	83	166	52	173	Dry starch, yellow dextrin, liquid glucose.
8. Floorco (C/o. Kerala Balers Ltd., Allepey Paravur, Quilon	16	20	150	55	Powerloom coir products.
9. Apollo Tyres Ltd., Chalakudy	2744	3120	2747	1100	Automobile Tyre & Tubes
10. Geetha Flour Mills, Pvt. Ltd., Thiruvalla.	37	50	158	95	Wheat products
11. Poabs Battery Containers Pvt. Ltd., Thiruvella.	37	43	20	41	Hard Rubber battery containers
12. Midas Rubber Pvt. Ltd., Ettumanur	154	180	144	72	Rubber compound
13. Mc. Dowell & Co., Ltd., Sherthallai	481	1050	970	400	Alcoholic liquors
14. Mambad Rubber Manufacturing Co., Ltd., Nilambur	30	35	20	20	Crumb rubber
15. Madras Rubber Factory Ltd., Vadavathur	155	200	220	310	Automobile tubes tread rubber etc.
16. Sreeram Roller Flour Mills, Kanjikode	30	35	135	50	Wheat flour, maida Sooji, atta, etc.
17. Forbes Evert and Figgis Pvt. Ltd., Ettumanoor	75	77	30	55	Rubber Mixing
18. Premier Breweries Ltd., Kanjikode	184	272	181	158	Beer.
19. Kerala Rubber and Reclaims Ltd., Mamala	54	64	53	67	Reclaimed Rubber
20. Fibre Foam Pvt. Ltd., Baliapatam	20	32	69	65	Rubberised Coir Products
Total	5906	8720	13370	5209	

TABLE 4

Agro-based Industries in the Large and Medium Sector as on April 1983

Sector	Existing Industries					Industries under Implementation		
	No.	*Gross Block (Rs. in lakhs)*	*Total investment (Rs. in lakhs)*	*Estimated turnover (Rs. in lakhs)*	*Employment (Nos.)*	*No.*	*Total Estimated Cost (Rs. in lakhs)*	*Employment Nos.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. Central Sector	1	81	96	350	200	..	..	..
2. State Sector	4	400	567	667	1,239	1	600	350
3. Joint Sector	1	134	148	80	141	2	722	240
4. Co-operative Sector	4	399	677	1,737	1,374	..	..	..
5. Private Sector	20	5,450	7,705	12,420	4,909	1	350	70
Total	30	6,464	9,193	15,254	7,863	4	1,672	660

Many of the agro-based industries for which raw materials are available in abundance in the State are working very much below the rated capacity. The rubber based industry viz., Trivandrum Rubber Works in the State Sector is working much below capacity. The two major automobile tyre manufacturing industries in the private sector viz., Apollo Tyres Ltd., and Premier Tyres Ltd., are also utilising only around half of their rated capacity. The Laxmi Starch Factory, Kundara has utilised only 37 to 55 per cent of the installed capacity during the five years since 1977-78. The low capacity utilisation of these industries is not due to shortage of raw materials, but due to technical, financial or labour problems which have to be studied in detail and remedial action taken so that the raw materials available in the State could be processed here itself.

In the case of Industries like the Sugar Mills viz., The Travancore Sugars and Chemicals Ltd., and the two Co-operative Sugar Mills at Pandalam and Chittur, the main difficulty is non-availability of Sugarcane in the required quantities, to fully utilise the installed capacity. The Travancore Sugars and Chemicals has an installed capacity to crush 900 tonnes of sugarcane per day. The availability of sugarcane per annum to this factory during the last five years from 1977-78 to 1981-82 varied from 79,788 tonnes in 1978-79 to 43,020 tonnes in 1981-82. This meant that the factory could work for 88 days in 1978-79 and 48 days in 1981-82. Another disturbing factor is the steady decreasing trend in the availability of sugarcane and the resultant shrinking of production and employment. Unless effective measures are taken for increased supply of sugarcane the factory might have to diversify its activities.

Installed capacity, production, rate of capacity utilisation and consumption of raw materials of certain important agro-based industries in the State are given in the Appendix.

Forest-based Industries

The major Central sector industrial unit using forest produce as raw materials is the Kerala Newsprint Project, Velloor, a unit of the Hindustan Paper Corporation. This project employing 1,800 persons is having a total investment of about Rs. 142 crores. The approximate annual turnover is Rs. 26 crores. Existing wood-based industries in the State Sector are Forest Industries (Travancore) Ltd., Alwaye and Travancore Plywood Industries Ltd., Punalur. These two units together have an investment of Rs. 2.26 crores and an annual turnover of Rs. 3.85 crores. The total number of employees in these two units together is 722. Another wood based industry in the State sector viz., Kerala Wood Industries Ltd., Nilambur is under implementation. This unit costing Rs. 555 lakhs has an employment potential of 450.

There are two existing industrial units and another unit under implementation in the Joint Sector. The existing units are Veneers and Laminations (India) Ltd., Tiruvalla and (2) Wood House Ltd., Koratty, both producing wood veneers. These two units with a total investment of about Rs. 3 crores have an annual turnover of about Rs. one crore and 169 employees. Shri Sai Maharaj Pulp and Paper Mills, Chittur, a unit under implementation in the Joint Sector is for the manufacture of poster paper etc. This unit costing Rs. 106 lakhs is expected to employ 180 persons.

There are 10 wood based industries in the Private sector. Of these 4 units come under large and 6 under medium scale. The large industrial units are: (1) Punalur Paper Mills Ltd., (2) Western India Plywoods Ltd., (3) Travancore Rayons Ltd., and (4) Gwalior Rayons Silk Manufacturing Co., Ltd. These four units account for 93 per cent of the total investment, 95 per cent of the turnover and 91 per cent of the total employment of 10 private sector units. A list of major forest based industries in the State giving gross block, investment, turnover, and employment, based on ownership pattern is furnished in he Table 5.

TABLE 5

Forest/Wood Based Industries in the Large and Medium Sector as in April 1983

Amount in Rs. lakhs

Name of Company	*Gross Block*	*Total investment*	*Approximate Turnover*	*Employment (Nos.)*	*Line of Production*
(1)	(2)	(3)	(4)	(5)	(6)
Central Sector					
1. Kerala Newsprint Project, Velloor	13889	14159	2600	1800	Newsprint
	13889	14159	2600	1800	
State Sector					
1. Forest Industries (Travancore) Ltd., Alwaye	17	43	79	149	Timber Products
2. Travancore Plywood Industries Ltd., Punalur	125	183	306	573	Plywood & allied products
Total	142	226	385	722	
Unit under implementation					
Kerala Wood Industries Ltd., Nilambur	..	555	..	450	Veneers & Joinery items
Joint Sector					
1. Veneers & Laminations (India) Ltd., Thiruvalla	124	205	96	69	Wood veneers
2. Wood House Ltd., Koratty	78	87	10	100	Wood veneers
Total	202	292	106	169	

Unit under implementation						
	Sri Sai Maharaj Pulp and Paper Mills Ltd. Chittur	..	106	..	180	Poster Papers etc.
private Sector						
1.	Standard Furniture Co. Kallai & Chalakudy	63	80	53	331	Wooden furniture etc.
2.	Punalur Paper Mills Ltd., Punalur	764	957	967	1107	Paper
3.	Western India Plywoods Ltd.—Baliapattam	1075	1542	1287	1581	Plywood, hardboard etc.
4.	Travancore Rayons Ltd., Perumbavoor	1276	1577	1737	2059	Rayon yarn, Cellulose Film etc.
5.	Phoenix Plywood Private Ltd. Erayilkadavu,, Kottayam	15	29	69	65	Tea Chests, Commercial and decorative plywoods.
6.	Bharat Plywoods and Timber Products Private Ltd., Baliapatam	55	60	93	150	Plywood
7.	Gwalior Rayon Silk Manufacturing (Wvg) Co. Ltd., Mavoor	2886	3222	2236	3146	Rayongrade pulp
8.	Wood Systems (India) Pvt. Ltd., Thiruvalla	57	77	10	90	Wood Veneers
9.	United Veneers Pvt. Ltd., Thiruvalla	51	54	40	79	Wood Veneers
10.	Southern Veneers & Wood Works Ltd., Tellicherry	48	59	72	55	Decorative Veneers
	Total	6290	7657	6495	8663	
Unit under implementation						
1.	The Canara Paper Mills Pvt. Ltd., Changanacherry	..	64	..	100	Kraft paper
	Grand Total—Existing Units	20523	22334	9586	11354	
Units under implementation		..	725	..	730	

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Plywood Industry

Plywood is made by first obtaining veneers from logs of wood and then super imposing and gluing layers of veneers in such a way that the grains of one ply are crosswise to those of the next one. The number and thickness of the layers of veneers or plys as they are called can be increased at will so as to attain a specified degree of strength or thickness. The main advantage of plywood compared to solid wood of equal weight is that it is more homogenous and resists strain to a greater degree. It has got good dimensional stability against shrinkage and does not warp. It can be moulded into many desired shapes and is less affected by climatic changes. Plywood increases the utility of the different species of wood in its natural form and also effects great economy in the consumption of natural wood.

Plywood was first introduced into the country as a packing material—as a concomitant of the development of tea exports from the tea estates of Assam, West Bengal and Kerala. Plywood tea chest combines the advantage of lightness, strength and durability and also prevents dimensional change due to swelling or shrinkage. The thickly wooded forests of western ghats abound in a large number of species ideal for plywood manufacture. The industry established itself firmly and expanded considerably thanks to the initiative and enterprise displayed by the entrepreneurs who were indomitably endowed with a zeal for innovation. Today the most modern and by far the largest plywood factory is located in Kerala—a testimony to the skill and daring of the promoters of the concern.

There is also a State Government concern at Punalur engaged in the manufacture of plywood products ranging from tea chests to decorative panels and flush doors. It was nearly 600 employees on its rolls and has drawn up schemes to manufacture medium density fibre board. The Western India Plywood Ltd., located at Baliapatam is one of the foremost in the timber based industries in the country, with complex units of plywood and hardboard factories. The unit manufactures a wide range of plywood and converted wood materials both engineered wood and reconstituted wood. Besides there are other plywood factories at Kottayam, Kalletumkara, Nemmara and Baliapatam.

Many of the Wood and other Forest Produce based Industries in the State are functioning much below their installed capacity because of the shortage in wood, reeds and bamboo. The four major

wood based industries in the State viz., Gwalior Rayons, Travancore Rayons, Punalur Paper Mills and Western India Plywoods have entered into contracts with Government for the supply of raw materials. Even then they do not get adequate quantities of raw materials. Punalur Paper Mills, with an installed capacity for producing 50,000 tonnes of paper per annum is producing only around eight to twelve thousand tonnes of paper per annum during the last five years, the rate of capacity utilisation being 18 to 25 per cent. The Forest Industries Travancore Ltd., an industry in the State Sector could enhance its rate of capacity utilisation from 33 per cent in 1977-78 to 96 per cent in 1981-82. But Travancore Plywood Industries Ltd., Punalur, another unit in the State Sector could utilise only 35 to 48 per cent of its installed capacity during the period. The Veneer manufacturing companies in the Private Sector are also functioning much below their installed capacity, as can be seen from Appendix, which gives the detalis like installed capacity, production, rate of capacity, utilisation and raw materials consumed in the forest based industries in the State.

Industries Based on Livestock and their Products:

The State had a livestock population of 56.45 lakh animals (1982 Census), consisting of 30.97 lakh cattle, 4.09 lakh buffaloes 20.04 lakh goats, 0.07 lakh sheep and 1.27 lakh pigs. Out of 15.09 lakh breeding cows, about 50 per cent are improved stock. Milk production in the State in 1981-82 was estimated to be 9.50 lakh tonnes.

The industries connected with Animal Husbandry can be categorised as those having forward linkage and others with backward linkage. Under the first category, there are cattle and poultry feed manufacturing units. Industries for the preservation and processing of milk, meat and other animal products are included under the second category.

Meat Products of India Ltd., is an industrial unit in the State Sector processing meat. This industry is implementing certain expansion programmes. Steps have been taken for the establishment of an export oriented buffaloe meat processing project at Chalakudy. In order to obtain sufficient chicken

and pigs the industry is running a livestock farm and it is proposed to expand the capacity of the farm. Another project on hand is the establishment of a large animal slaughter house attached to the factory. This slaughter house would be having a capacity to slaughter 7500 animals per annum and the total investment would be of the order of Rs. 32 lakhs.

Fruit (including coconut) Processing Industries:

Coconut.—About 3,000 million coconuts are being produced in Kerala. Out of this about 1,000 million nuts are used for domestic purpose and the balance converted into copra. It is estimated that out of three lakh tonnes of copra produced in Kerala, only 1.6 lakh tonnes are processed in the State. The balance of 1.4 lakh tonnes are sold outside the State. In the processing field, there are about 970 rotary mills and 62 expeller units in the State. The Kerala State Coconut Development Corporation has set up a Coconut Processing Complex at Mamom near Attingal. In order to maximise the milling of copra and other value adding operations the State has to find out means of getting a major portion of the 1.4 lakh tonnes of copra also milled within the State.

Rubber-based Industries:

Rubber is one of the most important cash crops in Kerala, next only to coconut. The production of rubber in the State has increased from 1.24 lakh tonnes in 1978-79 to 1.40 lakh tonnes in 1981-82 as a result of increase in area from 2.25 to 2.48 lakh hectares and productivity from 698 to 770 kg. per hectare (Productivity refers to the area registered under the Rubber Board—All-India production of natural rubber during 1981-82 was 1.53 lakh tonnes, of which 90 per cent was accounted for by Kerala.

While Kerala accounts for 90 per cent of the total production of natural rubber in India investment in rubber based industries in the State is only 8 per cent of the all India investment in such industries. The rubber industry in Kerala covers only a small range of products and has not attained any of the diversity that the industry has achieved in other parts of the country. Retreading material constitutes the single most important product in the Kerala's rubber industry. In fact almost 72 to 75 per cent of the rubber goods consumed within the State are brought from outside. Taking into account the consumption of small scale sector also, only about 15 per cent of the rubber produced in the State is processed within the State.

The two major tyre manufacturing units in the State are Premier Tyres Limited and Apollo Tyres Limited, both in the private sector. During 1981-82 the Premier Tyres consumed 6,451 tonnes of rubber and Apollo Tyres 4,689 tonnes. During the five years from 1977-78 to 1981-82, the rate of capacity utilisation of Apollo Tyres increased from 38 per cent to 56 per cent and that of Premier Tyres from 46 per cent to 76 per cent. The two rubber based factories in the public sector are Hindustan Latex Limited in the Central Sector and Trivandrum Rubber Works Limited in the State Sector. Consumption of rubber by the Hindustan Latex in 1981-82 was 789 tonnes and by the Trivandrum Rubber Works was ?79 tonnes. The rate of capacity utilisation in the Trivandrum Rubber Works during the period from 1977-78 to 1981-82 for cycle tyres varied from 23 to 46 per cent and that for tubes from 1.0 per cent to 2.5 per cent. Another rubber manufacturing unit in the joint sector viz., KTC Tyres (India) Limited is under implementation. The rubber based units in the private sector are Ruby Rubber Works Limited manufacturing bicycle tyres and tubes, Madras Rubber Factory Limited manufacturing automobile tubes, tread rubber etc., and Forbes Evert and Figgis Private Limited carrying out rubber mixing etc.

Industries based on Products and Bye-products of Major Crops:

The major food crop of Kerala is rice; but the internal production is only about one-third of the requirement of the State. In spite of several developmental programmes for rice production the State could not achieve self sufficiency. The gap in supply and demand is widening year after year due to increase in demand as a result of the rise in population and an almost stagnant level of production.

The industries based on rice milling are mostly in the small scale sector. Sri E. John Jacob Memorial Rice Mill, Kuttanad, a unit in the co-operative sector with an investment of Rs. 35 lakhs has an annual turnover of Rs. 25 lakhs and 36 employees.

The entire requirement of wheat in Kerala is met through imports from other States. Wheat required for distribution through ration shops and for industrial purposes is allotted by the Central Government. During 1981-82, 88,000 tonnes of wheat were allotted from the central pool to this State. Of this, 59,000 tonnes were distributed through ration shops and

the balance 29,000 tonnes were available for flour mills. There are four medium scale flour mills in the State viz., (1) Kerala Wheat Flour Roller Mills, Private Ltd., West Hill, Calicut; (2) Khemka Flour Mills Private Ltd., West Hill, Calicut; (3) Sree Ram Roller Flour Mills, Chandra Nagar, Palghat; and (4) Geetha Flour Mills Private Ltd., Sreekanth Road, Cochin.

The only major public sector industrial unit manufacturing wheat products is the Modern Food Industries (India) Limited, Edappally, Cochin. This Central sector industry with an investment of Rs. 96 lakhs has an annual turnover of Rs. 400 lakhs. This factory has an installed capacity to produce 123 lakh numbers (400 gm.) of bread and 47.66 lakh numbers (50 gm.) of bun. The rate of capacity utilisation of the factory has steadily increased from 68 per cent in 1978 to 158 per cent in 1982. Consumption of maida by this unit during 1982 was 53.87 lakh kg. allotted by the Central Government. This factory has a diversification programme for the manufacture of Cakes.

Tapioca is the staple food of the lower strata of the population in Kerala. The production of tapioca has increased from 16.6 lakh tonnes in 1960-61 to 51.8 lakh tonnes in 1975-76. There is a decline in the production of tapioca in the latter half of the seventies. Production of tapioca during 1980-81 was only 40.6 lakh tonnes and it has further decreased to 40.4 lakh tonnes in 1981-82. There are two large industrial units in the State manufacturing various products out of tapioca. They are (1) Laxmi Starch Ltd., Kundara, Quilon and (2) Tapioca Products Ltd., Chalakudy, Trichur. The Laxmi Starch Ltd., has an investment of Rs. 770 lakhs and an annual turnover of Rs. 1,030 lakhs. Main products of the factory are starch and allied products and glucose. Tapioca Products Ltd., Chalakudy produces Dry Starch, Yellow dextrin and liquid glucose. The annual turnover of the factory is about Rs. 52 lakhs. There are several units in the small scale sector manufacturing starch from tapioca. The total industrial utilisation of tapioca would be of about 2 to 3 lakh tonnes. Substantial quantities of tapioca produced in the erstwhile Malabar Region, especially in Malappuram district, are exported to Tamil Nadu for industrial use.

The Plantation Industry

The history of Tea Plantation Industry in India goes back to 1823 when the indigenous tea plant was discovered in North

East Assam by Major Robert Bruce, and the first consignment was exported in 1838. The first Tea Company, the Assam Company, was incorporated in London in 1893. Initially, tea estates were opened by British interests starting in the Assam valley. Later, the industry spread to South India, and so far as Kerala is concerned, cultivation was started in the Wynad by Capt. Bavan in 1837 and in the Travancore area, in 1860. By 1870, Tea planting was well established in India and there has been steady expansion since then.

Although British companies gave the lead in opening Tea Plantations, Indian enterprises soon came into the picture. Gradually, the share of British interests reduced and today, largely as a result of Foreign Exchange Regulation Act (FERA) in Kerala and elsewhere in India, there are no Tea Plantations owned by Foreign Companies although equity share interests are retained in a few Indian Companies.

Tea was known in China about 5000 years ago the origin of which is not unnaturally connected with legend. One such legend is of a Chinese Emperor who always boiled his drinking water. One day some leaves fell by chance into the hot water and delighted the Monarch with a new scent and flavour—that of the wild tea plant.

By 800 A. D. Tea drinking had spread to Japan where it was made into an elaborate ceremony which continues even today. It was not until 1610, however, that the first Tea reached Europe, brought by Dutch traders to Holland from China.

The name 'Tea' derives from the original Chinese word T'e (pronounced tay) or C'ha another version. From this come the English words Tea or the colloquial expression "a cup of cha" developed by British soldiers stationed in India.

Tea is the queen of beverages, and no other liquid except water, is consumed by so many. It is a pure, safe and helpful stimulant. "If you are cold, tea will warm you—if you are heated, it will cool you—if you are depressed, it will cheer you—if you are excited, it will calm you". So said Gladstone.

The total tea area in India is 3,65,081 hectares. Of these, Assam accounts for 1,92,427 hectares; West Bengal has 89,954 hectares. The area under tea in Tamil Nadu is 36,598 hectares. The total area under tea in Kerala is 36,150 hectares. This is 9.9% of the All India acreage and 48.5% of the South Indian Acreage.

In Kerala, the Tea Plantation Industry provides direct employment for 1,00,000 workers, besides supporting 3,00,000 employees in allied and ancillary industries.

Rubber cultivation was started only at the beginning of the present century, the first estate in the Travancore area being the Periyar estate on the banks of the Periyar river near Kothamangalam. Some of the original trees may still be seen near the Manager's bungalow.

The total area under Rubber in the country is 235,910 hectares, Kerala accounting for 214,415 hectares, and Tamil Nadu's share, mainly concentrated in the Kanyakumari District, being 11,683 hectares. Karnataka has nearly 8,000 hectares under Rubber. Rubber cultivation is slowly developing in certain other areas like Goa and the North Eastern region particularly in Tripura, Assam, Meghalaya, etc., but is highly dependent on proper soil conditions and weather patterns.

Unlike Tea there are a large number of small holdings in Rubber. Of a total area of 235,910 hectares, 167,770 hectares consists of 144,014 holdings of less than 20 hectares each, and 121,278 hectares are made up of 137,744 units of 4 or less hectares. There are only 67 estates of 200 hectares or more and their total area is only 40,758 hectares, i.e., 17.27% of the total.

Rubber plantations provide employment for about 170,000 workers.

Coffee came via Arabia in the 17th century. Systematic cultivation of Coffee began around 1834. In fact, the original Plantation Industry in the South was with Coffee.

Karnataka is the major Coffee growing State accounting for about 60% of the total area in the country, followed by Kerala with 25%, the balance being in Tamil Nadu. Kerala has 52,644 hectares of Coffee cultivation. This is an Industry with small grower preponderence. Corporate ownership and management is nominal in Kerala. The majority of units are below two hectares in extent. The main Coffee growing area is in north Kerala in the Wynad District; it is also grown in the Nelliampathies and the Idukki Districts. Robusta is the more popular variety in Kerala.

Coffee provides employment to about 80,000 workers in Kerala.

Cardamom was an ancient export from this country. Cultivation on a plantation basis started only about 90 years ago, but is fast becoming a popular crop.

The total area under Cardamom in India is 91,476 hectares, spread over Kerala, Karnataka and Tamil Nadu, the area under Cardamom in Kerala being 55,188 hectares or 60% of the total with the major portion in Idukki District. Cardamom plantations are mostly of small holdings, although progressively being taken up by the larger companies and Government Agencies.

Cardamom Plantations in the State utilise more than 40,000 workers.

Welfare Measures:

The Plantations Labour Act 1951 covering Tea, Rubber, Coffee and Cardamom plantations is an unparalleled piece of legislation providing for the most comprehensive welfare amenities for workers. The Act makes provision for supply of drinking water, conservancy, medical facilities, housing, creches, canteens, education, recreation, annual leave with wages, sick leave with benefits, protective clothing etc.

Plantation workers also get the benefit of provident fund, maternity benefit, gratuity, bonus, paid holidays etc.

The fringe benefits work out to 50% of the cash wages paid to a worker.

Marine-based Industries:

Nylon Net Factories.—Nylon fishing gear under use in the State at present is estimated to be 1,500 tonnes. It is estimated that the demand for nylon twine within the State would be 700 to 750 tonnes during the VII Plan period considering the requirement for growth envisaged in the fish production schemes and for replacement use. The State has

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4 nylon net factories at present, the biggest being that of the Kerala Fisheries Corporation with six machines. Apart from this, there are two private units in Cochin and one at Calicut with one machine each. The unit under the Kerala Fisheries Corporation has an annual production capacity of 30 tonnes per year and the three private units together has a capacity to produce about 14.4 tonnes. There is scope for expanding the existing nylon net factories and for establishing new ones. The Kerala Fisheries Corporation has drawn up a scheme for expansion of the capacity of the existing net factory from 30 tonnes to 150 tonnes per annum.

Boat Building Yards.—The State is at present having 23 boat building yards mainly in Quilon, Ernakulam and Kozhikode districts. The existing boat building yards in the State have a total production capacity of 186 boats per year.

Fish Processing Units.—Most of the existing units processing fish in the State for export purpose are in the small scale sector. At present there is only one unit in the large and medium scale sector engaged in the processing of sea food items viz., the Mermaid Marine Products Private Limited. This company having an investment of about Rs. 50 lakhs is manufacturing fishmeal, fish oil etc.

Chemical Industry:

The main advantages of the State had in setting up the existing industrial units and in attracting new industries in the chemical field were the large capacity for generation of cheap hydro-electric power, availability of good water for process and cooling purposes and the skilled and educated labour the State could provide.

A list of the chemical industries already established or under implementation within the State in large and medium sectors along with their main products and production capacities is given below:

TABLE—6

Name of Manufacturing Unit and Location	Products	Capacity (Annual)
(1)	(2)	(3)
(A) Central Sector:		
1. Fertilizers and Chemicals Travancore Limited Plants at Udyogamandal and Ambalamedu.	1. Ammonia	310,200 MT.
	2. Sulphuric Acid	580,800 MT.
	3. Ammonium Sulphate	198,000 MT.
	4. Ammonium Phosphate	148.500 MT.
	5. Superphosphate	44,500 MT.
	6. Ammonium Chloride	24.800 MT.
	7. Urea	330,000 MT.
	8. Phosphoric Acid	148,000 MT.
	9. NPK Fertilisers	485.000 MT
2. Hindustan Insecticides Limited, Udyogamandal.	1. DDT (Dichlorodiphenyltrichlorethane)	1,344 MT.
	2. BHC (Benzene Hexachloride).	3,000 MT.
3. Cochin Refineries Limited, Ambalamugal, Cochin.	1. Petroleum Producus	3.3 Million Tonnes.
	2. Asphalt	14.6 lakh drums
4. Hindustan Organic Chemicals Limited, Ambalamugal, Cochin.	1. Phenol	40,000 MT.
	2. Acetone	20,600 MT.

(b) *State Sector:*

1.	The Travancore Sugars and Chemicals Limited, Valanjavattom, Thiruvalla	1.	Sugar	324,000 MT.
		2.	Spirit	3.60 Lakh gallons
2.	Travancore Titanium Products Limited, Kochuveli, Trivandrum	1.	Titanium dioxide	24,500 MT.
		2.	Sulphuric Acid	90,000 MT.
3.	Travancore-Cochin Chemicals Limited, Udyogamandal	1.	Caustic Soda	57,750 MT.
		2.	Hydrochloric Acid	34,650 MT.
		3.	Liquid Chlorine	29,700 MT.
		4.	Sodium Sulphide	2,100 MT.
4.	Kerala Minerals and Metals Limited, Kovilthottam, Chavara, Quilon	1.	Ilmenite, Rutile, Zircon, Silimanite, Leucoxene and Monazite	25,000 MT. of Ilmenite and corresponding quantities of allied minerals
		2.	Titanium dioxide	22,000 MT.
5.	Kerala Soaps and Oils Limited, West Hill	1.	Soaps	9,000 MT.
		2.	Shark Liver Oil	300 MT.
		3.	Glycerine	260 MT.
6.	Kerala State Drugs and Pharmaceuticals Limited, Kalavoor, Alleppey	1.	Tablets	2,514 Lakhs
		2.	Granules	20 MT.
		3.	Capsules	
		4.	Injectibles:	
			A. Bottles	4.50 Lakhs
			B. Vials	15 Lakhs
			C. Ampoules	60 lakhs
7.	Kerala State Detergents and Chemicals Limited, Kuttippuram, Malappuram		Detergents	5,040 MT.

(c) *Joint Sector*:

1.	Kerala Chemicals and Proteins Limited, Kathikoodam, Koratty, Trichur	1.	Ossein	2,960 MT.
		2.	Dicalcium Phosphate	3,810 MT.
2.	Kerala Cholorates and Chemicals Limited, Erezha North, Mavelikara		Potassium Cholorate	1,000 MT.
3.	Premier-Morarji Chemical Company, Limited, Kalavoor, Alleppey		Sulphate of Alumina (Ferric alum)	16,500 MT.
4.	Formalin Products Limited, Kalavoor, Alleppey	1.	Formaldehyde	7,300 MT.
		2.	Haxamine	900 MT.
		3.	Urea formaldehyde	2,000 MT.
		4.	Paraformaldehyde	150 MT.
5.	Venad Pharmaceuticals and Chemicals Limited, Thazhakara, Mavelikara		Transfusion fluids	3,000 bottles per day
6.	Carbon and Chemicals India Limited, Ambalamedu, Cochin		Carbon black	17.500 MT.
7.	Castols (India) Limited, Kuttippuram, Malappuram		Polyols	1,200 MT.
8.	Malabar Phytochemicals Limited, Nilamboor, Malappuram	1.	Alkaloids	13.75 MT.
		2.	Papain	15 MT.
		3.	Essential oils	45 MT.
9.	Sri Sai Maharaj Pulp and Paper Mills Limited, Chittoor, Palghat		Straw boards	3,000 MT.
10.	Pigments India Limited, Thazhakad, Mukundapuram, Trichur	1.	Sodium Sulphate	840 MT.
		2.	Sodium and Potassium dichlorate	450 MT.
		3.	Synthetic red oxide of iron	150 MT.
		4.	Synthetic yellow oxide of iron	150 MT.
		5.	Chromium Pigments	450 MT.

(1)	(2)	3
11. Pragati Paints Limited, Baliapatam, Cannanore	Synthetic enamels, Varnishes and paints	3,000 MT.
(d) *Private Sector:*		
1. The Tata Oil Mills Company Limited (Units at Tatapuram, Cochin and Trikoil Lane, Big Bazaar, Calicut	1. Soaps	55,300 MT.
	2. Synthetic Detergents	18,400 MT.
	3. Glycerin	1,600 MT.
	4. Toilet Preparations	2,100 MT.
	5. Vanaspathy	24,300 MT.
	6. Cattle and Poultry feed	110,000 MT.
	7. Marine Products	2,000 MT.
2. Punalur Paper Mills Limited, Punalur, Quilon	Paper	50,000 MT.
3. Travancore Chemical and Manufacturing Company Limited, Kalamassery and Kundara	1. Copper Sulphate	3,000 MT.
	2. Potassium Cholorate	3,250 MT.
	3. Sulphate of Alumina Sodium Aluminate	1,020 MT.
4. The Travancore Electro-Chemical Industries Limited, Chingavanam, Kottayam	1. Calcium Carbide	45,000 MT.
	2. Acetylene Black	2,000 MT.
5. The Travancore Rayons Limited, Perumbavoor	1. Rayon yarn	3,300 MT.
	2. Cellulose	4,000 MT.
	3. Cotton linter Pulp	7,200 MT.
	4. Sulphuric acid	18,288 MT.
	5. Carbon di-sulphide	3,210 MT.

6.	Laxmi Starch Limited, Kundara, Quilon	1.	Starch and allied products	63,000 MT.
		2.	Glucose	12,000 MT.
		3.	Cattle and Poultry Feeds	14,000 MT.
7.	The Gwalior Rayon Silk Manufacturing (Weaving) Company Limited, Birlakootam Mavoor	1.	Rayon grade Wood Pulp	72,000 MT.
		2.	Staple Fibre	78,000 MT.
8.	Cominco Binani Zinc Limited. Binanipuram	1.	Zinc	17,000 MT.
		2.	Sulphuric Acid	36,000 MT.
		3.	Cadmium	36 MT.
9.	The Southern Gas Limited (Units at Udyogamandal and Feroke, Calicut)	1.	Oxygen	15 lakhs M^3
		2.	Acetylene	180,000 M^3
10.	Tapioca Products, Chalakudy, Trichur	1.	Starch	36,000 MT
		2.	Glucose	14,000 MT.
11.	Periyar Chemicals Limited Edayar, Binanipuram	1.	Formic Acid	1,500 MT.
		2.	Sodium Sulphate	12,250 MT.
12.	United Catalysts India Limited, Edayar, Binanipuram		Catalysts	2,450 MT.
13.	West Coast Industrial Gases Limited, Perumanoor. Ernakulam	1.	Oxygen	11.88 lakh M^3
		2.	Acetylene	2.4 lakh M^3
14.	T.K. Chemicals Limited, Kochuveli, Trivandrum	1.	Electrolytic Manganese dioxide	900 MT.
		2.	Manganous Sulphate Monohydrate	900 MT.
15.	Kerala Acids and Chemicals Limited, Edayar	1.	Formic acid	1,200 MT.
		2.	Sodium Sulphate	1,870 MT.
16.	The Canara Paper Mills Private Limited, Chettipuzha. Kurisumoodu, Changanacherry		Kraft Paper	2,000 MT.

The Travancore Electro-Chemical Industries Limited, a Public Limited Company, started commercial production of Calcium Carbide in the year 1965. At that time it had only an installed capacity of 10,000 metric tonnes of Calcium Carbide per annum. During 1971-72, the capacity was increased to 15,000 tonnes per annum. The licenced capacity was further increased to 25,000 tonnes per annum in the year 1975. That was after installing the second plant. Later licenced capacity was increased to 40,000 tonnes per annum on the basis of expansion scheme submitted by the company.

Calcium carbide is the basic inorganic chemical used in the production of Acetylene gas and it is a starting material in the manufacture of many organic chemicals. When lime and carbon are mixed together and heated to very high temperature, the lime is reduced and liberated Calcium combines with the excess of carbon to form Calcium Carbide. The main raw materials required for manufacture of Calcium Carbide are lime-shell. Charcoal, Petroleum, Coke and Carbon Electrode Paste. When Calcium Oxide and Coke are heated at a temperature of 2200 C., Calcium Oxide is converted into Calcium Carbide. Calcium Carbide being an electro thermal product, power is an important component of its cost of production. Calcium Carbide is primarily used for generation of Acetylene gas.

Modernization process was started by the company in the year 1982 by closing down one of the furnaces. After the modernization, now all the three plants are producing Calcium Carbide. The lime-shell is the main component in the production of Calcium Carbide. The Calcium Carbide industry is power intensive one. To produce one tonne of Calcium Carbide, about 4500 KW. electrical energy is required. On account of the power shortage, in almost all the States production of Calcium Carbide was considerably reduced. And yet, marketing position remained as steady. Calcium Carbide is used for manufacturing Acetylene gas and PVC resins. The PVC

industry is having rapid growth in India. Among the five producers of Calcium Carbide the major producer is the management company themselves.

The management is getting the principal raw materials viz., Calcium Carbonate (lime-shell) mainly through dredging operation in the Vembanadu backwaters. The dredging out of Calcium Carbonate is comparatively cheaper. But apart from the lime-shell dredged out, the management is purchasing on a regular basis locally available lime-shell also for ensuring steady production of Calcium Carbide.

Scope for promotion of Chemical Industries in Kerala:

Chemical industry had a comparatively early start in Kerala with the establishment of the Fertiliser factory in 1946. Thereafter some other units have also come up but subsequent growth of the industry had not been appreciable when compared with the rest of India. All the same, it can be seen that the base has widened further due to the establishment of units for Caustic Soda, Oil refinery, Calcium Carbide, Zinc etc. Kerala has also a few technical consultancy agencies specialising in the field.

In recent years petrochemical and other organic chemical projects have come up in different parts of the country offering various basic chemicals. These developments gave a phenomenal impetus to the growth of chemical industry elsewhere. The effects of these developments have not been felt in the State, to any significant extent. The main reason for the State not being able to make use of the opportunity is that due to the southern most location of the State, the chemicals serving as raw materials and finished products have to be transported over long distances. More than increasing freight charges, the uncertainties in continuous supply of the required inputs constitute the major problem. Owing to this limitation, emphasis has to be laid on development of projects either having

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the advantage of locally available raw materials of manufacturing products having a ready market locally or possessing any other distinct local advantage or export potential.

There are a number of large scale chemical units in the State. Projects can be planned producing the various inputs required by these units or utilising the products, bye-products or waste materials from these units. The large units themselves may not be in a position to set up projects of this kind but they can extend all possible help to entrepreneurs. A few such feasible projects are indicated below.

Petroleum Based Products and Petrochemicals:

Cochin Refineries is the only unit within the State processing petroleum and they have been working hitherto only on a limited range of products like Gasoline (petrol and diesel), kerosene, naphtha, furnace oil (including LSHS) and asphalt besides LPG, now using imported crude supplemented with some amount of Bombay High. Using increased quantity of Bombay High Crude, they have a proposal to process aromatic feed stock containing Benzene, Toluene and Xylene. In addition propylene also will be available.

Hindustan Organic Chemicals is setting up a plant near the Refineries to produce Phenol and Acetone, making use of the Benzene and Propylene via Cumene route. FACT has taken up a scheme to manufacture Caprolactam and this will ensure another outlet for the Benzene. While Naptha is already being used as feedstock for production of fertilisers by FACT, the Refinery will be left with substantial quantities of Naphtha, a potential item for opening up a series of chemicals of considerable commercial importance.

Cochin Petroleum Refinery:

The importance of petroleum to a country needs no special emphasis. It is a sine qua non for energy, power, defence equipment and transportation requirements. The search for petroleum in India is almost as old as in most of the advanced countries. The first bore hole drilled for oil in India was in 1866—in upper Assam. With the separation of Burma from India in 1937, India's deficiency in Petroleum became apparent and following the partition in 1947, the oil fields of Potwar

went to Pakistan. India was left with the aging Digbol oil fields whose reserves were gradually depleting. Till 1954, the Assam Oil Company was the only concern producing oil.

Oil industry being capital intensive, its operations are complicated and in this respect it is different from a normal industrial organization in India or abroad. It was with this background and also with a view to intensifying the search for mineral oil, a separate department for the exploration of oil and natural gas was established in 1955, by the Government of India, with headquarters in Dehra Dun. In 1958 it became a Commission and then an autonomous body.

In India nearly 1,036,000 sq. km., are covered by marine sediments of recent origin besides off-shore coastal tracts which can be called the potential home of petroleum This has to be proved by intensive geological, geophysical surveys and by wide coast drilling.

The Government of India has constituted a separate organization 'Indian Refineries' to run these public sector refineries. The Government of India in May 1963 concluded on agreement with the Philips Petroleum Company of U. S. A. and Duncan Brothers Calcutta to set up a refinery of 2.5 million tonnes. It is located at Ambalamukal on the eastern bank of Chitrapuzha River 16 km. from Cochin Port.

The main objective in setting up this refinery was to meet the increasing demand for petroleum products and to conserve the limited foreign exchange reserves of the country by a substantial reduction in the importation of refined products. Cochin Refineries is a public limited company. Government of India own 52.8% of the equity and therefore this enterprise is the fourth refinery in the public sector. The authorised capital of the Company is Rs. 15 crores and the actual issued subscribed and paid up capital is Rs. 7 crores. The plant as installed in September 1966 was designed to process 2.5 million tonnes per annum or 50,000 barrels per day of light Iranian Agajhai Crude. The refining capacity was expanded to 66,000 barrels of crude oil per day or 3.3 million tonnes per annum in September 1973. Facilities for producing and bottling liquefied Petroleum Gas (LPG) have also been added. The raw material is crude petroleum imported from Persian Gulf and indigenous Bombay High Crude which is processed. Crude oil is transported to Cochin in medium range tankers. Cochin Port constructed a jetty on the Ernakulam Shore-line for tanker unloading. The crude is pumped directly to the refinery storage

tanks through a 30 inch pipeline stretching 12 kilometres from the jetty to the refinery site. The refinery produces Motor Spirit, Naphtha, kerosene, diesel oil, furnace oil, liquefied Petroleum Gas (cooking gas) and Aviation Turbine Fuel (A. T. F.). The Refinery caters to the demand for petroleum products in entire Kerala and certain areas of Tamilnadu and Karnataka States. The Cochin Refinery has one of the most modern and elaborate systems for treatment of refinery effluents. Apart from conventional physical removal of oil contamination, chemical and biological steps of treatment are also utilised. Thus from its inception the Refinery has taken effective measures to avoid pollution of rivers or backwaters adjoining its location. The Refinery employs nearly 500 persons. Besides savings effected in foreign exchange, the Refinery has contributed to the growth of small and large industries in its vicinity. The regular and uninterrupted supply of vital Naptha to FACT, Cochin Division is a feature of the Refineries operation.

The Government of India have approved the installation of a one million tonne per annum fluid catalytic cratking unit in the Cochin Refinery in order to produce additional middle distillates and liquefied petroleum Gas out of atmosphere residue which is now converted into residue oil. The capital cost of the project is estimated to be about Rs. 100 crores. The project when completed will increase the installed capacity of the refinery to 3.5 million tonnes. Plans are underway to expand the refining capacity to 4.5 million tonnes at an estimated cost of Rs. 15.93 crores.

Engineering Industries:

At present there are only less than 50 industrial units in the State in the large and medium sector which can be considered as engineering industries. This includes nearly 20 units which come under electrical industries. Units under the Kerala State Electronics Development Corporation are not included in this list, since it is given separately.

Out of the total number of units, 5 units come under Central Sector. They are (1) Balmer Lawrie & Company Ltd., Aroor. (2) H.M.T. Ltd., Kalamassery (3) Cochin Shipyard Ltd., Cochin, (4) Indian Telephone Industries Ltd., Palghat and (5) Instrumentation Ltd., Palghat. According to provisional figures, the total investment in these 5 units is about Rs. 16,285 lakhs. About 4000 people are employed in these units.

In the State sector there are 11 units, seven under general engineering industries and 4 under electrical industries. The units under General Engineering Industries are (1) Chalakudy Refractories Ltd., (2) Kerala Premo Pipe Factory Ltd., (3) Scooters Kerala Ltd., (4) Steel Industrial Kerala Ltd., (5) Kerala Agro Machinery Corporation Ltd., (6) Steel Complex Ltd., and (7) Astral Watches Ltd. The following are the units that come under Electrical Industries. (1) United Electrical Industries Ltd., (2) Kerala Electrical and Allied Engineering Company Ltd., (3) Transformers and Electricals Kerala Ltd., and (4) Traco Cable Company Ltd. The total investment in the State Sector Engineering Industries is about Rs. 4,206 lakhs, the annual turnover Rs. 4,937 lakhs and the number of people employed is about 4,700.

In the private sector, including the units under electrical industries, there are 24 units. The total investment made in these units is about Rs. 10,413 lakhs and the annual turnover is about 14,932 lakhs. The number of people employed in the engineering units under the private sector is 10,780.

A few industrial units are under various stages of implementation both in the State sector and in the private sector. The estimated investment in these units will be in the order of Rs. 4,406 lakhs with an employment of 3,291 persons. Detailed information regarding the number of existing units in different sectors, the total investment and employment provided in each unit are furnished in Appendix.

Instrumentation Ltd., Palghat

With increasing emphasis on industrialisation, process plants have embarked on quality improvement programmes adopting sophisticated technology. As a result, the demand for high technology instrumentation systems has increased. Instrumentation Limited, a Government of India enterprise, is a major supplier of instrumentation systems.

The company was established in 1964 to ensure maxunum self-reliance in providing instrumentation schemes on turnkey basis to core sectors of the economy. The first unit of the company, located at Kota in Rajasthan, commenced production in October 1968 in technical collaboration with the Soviet Union. The second unit, at Palghat, commenced production of control valves, safety valves, actuators, power cylinders,

accessories of control valves and allied items in December 1975 in technical collaboration with Yamatake-Honeywell Company Ltd., of Japan.

The exacting control and instrumentation requirements of various process industries including superthermal power stations, steel plants, fertilizer plants and refineries, are now being met by the company, and for this, it has launched several diversification plans. It has more than six collaboration agreements with internationally reputed firms; in the export market also, the company has made significant progress.

The Palghat unit had a turnover of Rs. 2 crores in 1976-77 which rose to Rs. 15 crores in 1984-85 yielding a profit of over Rs. 1 5 crores.

The R & D team of the unit has developed a number of products, some of them winning innovation awards. The bellow sealed valves developed for nuclear application need special mention.

The unit is now working on diversification plans to meet the needs of off-shore drilling.

To foster technology development and to establish high reliability standards, it is setting up a fluid control research institute at Palghat with UNDP aid. With this institute, the first of its kind in India, Instrumentation Limited will be taking a major step towards self-reliance in high technology in the field of instrumentation.

Perhaps the Palghat unit is the only factory where comprehensive facilities exist for all-round testing and manufacture of control valves and allied items. The laboratory includes noise measurement, radiography and clean room. A numerically controlled machine recently installed caters to the need of sophisticated valve manufacture, and guarantees accurate performance of the critical item.

Aluminium-based Engineering Industries

It is worth mentioning that the erstwhile Travancore State which now forms a part of Kerala was a pioneer in establishing an Aluminium Smelter Plant. The Indian Aluminium Company's Smelter at Alupuram in the State was the first large scale aluminium smelter to be established in India.

Machine Building Industries

The Kalamassery Unit of HMT manufactures Printing Machinery. The large printing machinery manufacturers are also moving to the offset field. Its capacity utilization in 1981-82 was 75%

Steel Structural Fabrication

Within the State, there are already in existence small and medium sized structural steel fabrication units like Steel Industrials Kerala Limited, Kerala Electrical and Allied Engineering Company Limited, FACT Engineering Works, with capacity ranging from 50 t to 150 t per month.

Electrical Industries

In Kerala, among the engineering industries, the electrical industry has developed more significantly. Compared to other engineering industries in the State, the electrical industry has attracted more private capital. Some of the prominent companies in this field are the following about which descriptive accounts have already been made in the respective District Gazetteers.

1. Aluminium Industries Limited.
2. Eddy Current Controlls (India) Limited.
3. Premier Cable Company Limited.
4. Toshiba Anand Batteries Limited.
5. Kerala Electric Lamps Limited.
6. Transformers and Electricals Kerala Limited.
7. United Electrical Industries Limited.

Brief descriptions of some of the units are given:

The Transformers & Electricals Ltd., (TELK) at Angamaly in Ernakulam District (established in 1963) is a Government owned enterprise. It is one of the reputed manufacturers in India of High Voltage Electrical Equipments (upto 600 KV class) like Power Transformers, Sulphur Hexafluride. Gas filled Circuit Breakers, Current & potential transformers, Bushings and on load|off current tap changers etc. These are being manufactured with the technical collaboration from M|s Hitachi Limited, Japan, who is one of the leading manufacturers in this field. Nearly 1600 persons are employed in this unit.

The United Electrical Industries, Quilon, founded in 1950 is another Government owned unit, manufacturing electrical engineering products like KWH meters, Motor Control Gears, L. T. & H. T. Switch gears, Electronic components, plastic film capacitors, carbon film resistors etc. Fabrication of other electrical items is also carried out in this factory which provides employment to about 550 persons.

The Tracco Cable Company at Irumpanam in Ernakulam District is another Government owned unit started in 1960 which produces power cables, AAC & ACSR and lead sheathed underground telephone cables etc., for supply to the Electricity Board, various government organisations and Indian Posts and Telegraphs department etc. Nearly 250 employees work in this factory. The company has on its hand a project for the manufacture of 5000 LKM—Jelly-filled telephone cables on the basis of a letter of intent from Government of India.

The Kerala Electrical & Allied Engineering Company Ltd., a subsidiary of the Government owned Kerala State Industrial Enterprises has 3 units in Mamala in Ernakulam District, Kundara in Quilon and Olavakkode in Palghat District. The Company manufactures electrical equipment like Brushless Alternators, Distribution Transformers, Steel Structures, Galvanised Structures, HRC Fuses and employs 760 on its rolls.

The Eddy Current Controls (India) Ltd., at Chalakudy in the private sector manufactures Variable Speed Motors in technical collaboration with Yasakawa Electric Manufacturing Company Ltd., Japan. The firm has a commendable share in the Indian market for variable speed motors. The promoters of this company have also launched a project in Puthenchira in Trichur District to manufacture industrial microwave heating equipments in collaboration with a French firm, which is one of the pioneers in the field of manufacturing Microwave equipments.

Cochin Shipyard, which is the largest shipyard in India, is at present engaged in the contruction of 75,000 DWT Panamax Bulk Carriers. The yard has the installed capacity of 2 ships (150,000 DWT) per annum.

Electronics Industry:

An over view of the Industry.—Till the early 1970's there were hardly any Electronics industry in the State except two

units in the private sector. 1973 witnessed the launching of Kerala State Electronics Development Corporation Ltd., (KELTRON) as the nodal agency for the overall development of Electronics industry in the State.

The Corporation's activities commenced in June, 1973. During the short span of ten years, the Corporation has made significant progress with regard to the number of schemes implemented either directly or through different companies incorporated under the auspices of the Corporation.

KELTRON's leadership in the development of Electronics Industry in the country, its impact on Kerala's industrial culture, its past performance and its hopes for the future are dealt with briefly.

Recognising the need for research and development in Electronics, Government have set up an Electronics Research and Development Centre for taking up application oriented R & D Projects. This Centre employs 500 persons directly and has a total capital investment of Rs. 200 lakhs. It works in close co-ordination with the KELTRON group.

The Testing and Development Centre promoted by the Electronics, Government have set up an Electronics Research and Development Centre. The Centre provides service facility for the entire electronics industry in the State for testing and evaluation of their products. The investment in this centre is Rs. 46 lakhs and it employs 20 persons.

A central tool room was started in 1976-77 by the KELTRON with the approval of Electronics Commission and with State Government grants. Later on the State Government have agreed to treat the Central Tool Room as a division of the KELTRON and the grants given to it have been converted into share capital. The total investment of Government amounts to Rs. 93 lakhs. During 1982-83 the unit has achieved a turnover of Rs. 8 lakhs.

Apart from KELTRON, there is another Government Company which is engaged in manufacture of Electronic Components, viz., United Electrical Industries, Quilon. They are manufacturing carbon film resistors and plastic film capacitors. Their investment in these two projects is estimated to be Rs. 100 lakhs and employs about 100 persons directly. Annual turnover is Rs. 100 lakhs.

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In the private sector, there are two companies viz., BPL India Pvt. Ltd., and O|E|N India Limited, who are engaged in electronics. Besides, ALIND has recently entered into manufacture of static relays. The total investment in electronics in the private sector is estimated to be about Rs. 10 crores giving a turnover of around Rs. 20 crores. Direct employment is estimated to be about 1,700 persons.

In the Central Sector, Indian Telephone Industries has set up an Electronic Switching Equipments Unit at Palghat. The present investment in this company is about Rs. 2 crores and employs about 200 persons directly.

In the small scale sector, the total number of organised units is around 25 with a total investment of nearly Rs. 1 crore. The present turnover is estimated at Rs. 2 crores and employment potential about 500.

The total investment in electronics sector in the State as on 31-3-1983 works out to about Rs. 53 crores and this sector provides direct employment to about 6,700 persons. The indirect employment is estimated to be around 20,000 persons. The turnover of electronics sector in the State ten years back i.e., in 1971-72 was only Rs. 50 lakhs. This indicates the progress made by the electronics sector in the State and shows that strong foundation has been laid for the growth of this sector during the last decade.

It is noteworthy that KELTRON has scored several firsts in the field of electronics in the country. Reviewing the achievements at the end of the first decade of its existence KELTRON has proudly recorded its various first as follows:

1. First in the country to design and manufacture a 90 KVA UPS system installed at Reactor Research Centre, Kalpakkam.
2. First to develop a 100 HP AC and manufacture a 650 HP micro-computer based DC drive installed at Gas Turbine Research Centre, Bangalore.
3 First in India to develop a micro-computer based mass display system for public utilities like information display systems at major Airports and instal at Palam Airport in time for ASIAD 1982.
4. First to design, develop and manufacture a micro processor based card attendance sytsem and impulse clock system for factories and offices.

5. First to develop an indigenously designed ISI based *annuciation system* for power plants and process industries.

Within a span of three months, News-Scan systems were designed, engineered and manufactured for visual display of news hitherto transmitted through teleprinters.

6. First to design and develop micro processor based programmable controller for process automation.
7. First to design an electronically assisted test competition system for Malayalam language.
8. First to give the country a modular micro processor based system for industrial control.
9. First to engineer and manufacture echo injector procedure teacher, diver-held sonar, sonar simulators, ship control unit and air display plot for the defence, and
10. The first to organise Women Co-operatives and Women's Society founded by Central Social Welfare Board for Radio Assembling Units in the State.

Technical collaboration for many of KELTRON's projects come from various countries. Belgium's Sprague Electromag was the first collaborator for manufacture of aluminium electrolytic capacitors. This was followed by second collaboration with the Controle Bailey of France for manufacture of electronic control instrumentation systems. Other collaborators of KELTRON include Masoneilen of USA for control valves, Brown Boveri Kent of UK for analytical instrumentation and Hitachi of Japan for data acquisition systems.

KELTRON has become a leader in decentralised industrialisation. Its factories with several subsidiary and associate units can be found all over Kerala. Employment opportunities generated by KELTRON provide direct employment to 3,749 persons out of which 30% are executives and supervisors. This high percentage of technocrat-oriented industrial complex

is a special characteristic of the electronics industry and KELTRON. KELTRON and its subsidiaries and associates have provided indirect employment for over 20,000 persons.

There are more than 200 ancillaries and small scale units supplying various sub assemblies to KELTRON. There are also 20 companies which are supplying finished products to KELTRON like voltage stabilisers, calculators for marketing under KELTRON brand name. The ancillary units generally employ an average of 25 people. Organisation of women's co-operatives for such assembly work is a pioneering experiment.

KELTRON's pre-eminence however is in the field of high technology products. Credit for this should go to the Electronics Research and Development Centre (ERDC). Started as an R &D Unit of KELTRON it was converted in September, 1974 into an autonomous body directed by an independent Board of Governors under the State Government's Science and Technology Programme. It is recognised by Central Government's Department of Science and Technology and many academic institutions send students to it for Post Graduate and Doctoral Research Programmes. The level of research in the ERDC is recognised to be of top quality and can compare with work done in similar fields anywhere in the world. Over 200 scientists most of them young work in ERDC.

Work is being done by the Centre on Cybernetic systems group which has designed a range of microcomputers. Except for basic chip, every component is indigenous. Some designs to architecture these microcomputers are completely KELTRON's contribution. These microcomputer systems have been sold to bodies like Bhabha Atomic Research Centre and Bhilai Steel Plant. KELTRON was given an award for this year by the Federation of Indian Chamber of Commerce and Industry in recognition of the outstanding work done by the Centre. The Centre has also received the ELCINA Award for outstanding performance in the area of technology development in electronics.

TABLE 7

Large and Medium Industries in Kerala as in April 1983

Industry	Number		Total Investment (Rs. in lakhs)		Employment (Nos.)	
	Existing	Under Implementation	Existing	Under Implementation	Existing	Under Implementation
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 *Textile Industry*						
(a) Central Sector	5	..	1,270	...	4,639	..
(b) State Sector	5	..	1,412	..	3,094	..
(c) Joint Sector	1	..	161	..	554	..
(d) Co-operative Sector	2	1	704	450	1,628	600
(e) Private Sector	17	..	7,302	..	11,596	..
Total	30	1	10,849	450	21,511	600
2. *Chemical Industries*						
(a) Central Sector	4	1	30,085	5,000	9,828	200
(b) State Sector	5	1	5,767	850	4,121	500
(c) Joint Sector	5	5	765	1,986	384	491
(d) Co-operative Sector	1	..	34	..	60	..
(e) Private Sector	13	4	4,268	355	3,871	355
Total	28	11	40,919	8,191	18,264	1,546
3. *Electronics/Electrical*						
(a) Central Sector	2	..	1,031	..	165	..
(b) State Sector	12	..	4,618	..	4,171	..
(c) Joint Sector	1	..	155	..	105	..
(d) Co-operative Sector	..	..	..	..	..	..
(e) Private Sector	9	4	5,045	629	4,524	194
Total	24	4	10,849	629	8,965	494
4. *Engineering Industries*						
(a) Central Sector	3	..	15,254	..	3,594	..
(b) State Sector	7	2	1,224	2,662	1,631	2,282
(c) Joint Sector	..	4	..	965	..	452
(d) Co-operative Sector	..	..	..	..	..	..
(e) Private Sector	15	1	5,368	150	4,262	63
Total	25	7	21,864	3,777	9,487	2,797

(1)		(2)	(3)	(4)	(5)	(6)	(7)
5. *Agro-based Industries*							
(a)	Central Sector	1	..	96	..	200	..
(b)	State Sector	4	1	567	600	1,239	350
(c)	Joint Sector	1	2	148	722	141	240
(d)	Co-operative Sector	4	..	677	..	1,374	..
(e)	Private Sector	20	1	8,720	350	5,209	70
	Total	30	1	10,208	1,672	8,163	660
6. *Mining/Mineral based-Industries*							
(a)	Central Sector	1	..	796	..	937	..
(b)	State Sector	3	1	600	4,225	1,250	1,000
(c)	Joint Sector	1	1	272	124	397	60
(d)	Co-operative Sector	..	..	..	..	..	..
(e)	Private Sector	5	2	539	680	3290	200
	Total	10	4	2,207	5,029	5,874	1,260
7. *Forest/Wood-based Industries*							
(a)	Central Sector	1	..	14,159	..	1,800	.
(b)	State Sector	2	1	226	555	722	450
(c)	Joint Sector	2	1	292	106	168	180
(d)	Co-operative Sector	..	..	..	..	..	
(e)	Private Sector	10	1	7,657	64	8,663	100
	Total	15	3	22,334	725	11,354	730
8. *Marine-based Industries*							
(a)	Central Sector	..	..	..	..	..	..
(b)	State Sector		..	..	..	..	..
(c)	Joint Sector	..	..	..	..	..	..
(d)	Co-operative Sector	..	..	..	..	..	..
(e)	Private Sector	1	..	30	..	27	..
	Total	1	34	119,262	20,473	83,645	8,097

Source:—S & P Division. KSIDC.

Small Scale Industries

Small scale industries have been defined (from 1980) as units having an investment in plant and machinery upto Rs. 20 lakhs (Rs. 25 lakhs for ancillaries).

The number of Small Scale Industrial (S.S.I.) units in Kerala has grown from 221 in 1958 to 24,884 in 1982-83. The growth had picked up momentum during the period 1979-80 to 1982-83. During this period the number of Small Scale Industrial units increased from 15,974 to 24,884. The latest figures on capital investment, production and employment are not available. The Directorate of Industries and Commerce is at present conducting a survey on the above. As on 31-3-1978 the investment on about 12,200 Small Scale Units was assessed at Rs. 52.06 crores where the average investment per unit works out to Rs. 43,000. The employment generated was for 2.16 lakhs of persons. The average employment in these units was of the order of 17.7 and average investment per employee was Rs. 2,408. As on 31-3-1981 the total number of registered units increased to 18,893 and the employment to 2.39 lakhs. The average employment per unit was 13 persons.

The growth of Small Scale Sector in Kerala has been impressive in terms of numbers and as on 31-12-1982 there were 23,746 registered units in the State. Sanctioning of 5 Industrial Estates in the beginning of the Second Five Year Plan was a landmark in the growth of Small Scale Sector in Kerala. Two more were sanctioned in the same Plan period. Another significant event was the implementation of the Rural Industries Programmes (1962-63) during the Plan period. Two projects, one at Alleppey and the other at Kozhikode were started. According to this scheme industrial units costing upto Rupees one lakh were set up by the entrepreneurs on hire purchase basis. There were altogether 18 industrial estates by the end of the Third Plan.

During the Fourth Plan period, instead of industrial estates, the scheme of Development Plots near cities and towns was taken up. Six such development plots were started during this period. The Fourth Plan witnessed the emergence of the Functional and Ancillary Industrial Estates. A Common Facility Service Centre was started for the first time in the State. The Department took initiative to tie up financial institutional such as Kerala Financial Corporation and Commercial Banks to provide loans to the units. The Government offered interest subsidy for the loans taken from Kerala Financial Corporation. In order to ensure regional balance in growth of industries, Government of India offered investment sub-

sidy of 10 and 15 per cent in backward and most backward districts respectively. The scheme came into effect from 26th of August 1971. Trivandrum and Trichur were treated as backward and Alleppey, Malappuram and Cannanore as most backward.

During the Fifth Plan Period, the Government has created a post of Development Commissioner for Small Scale Industries (D. C. S. I.) so as to provide a package of services. The Director of Industries and Commerce was looking after multifarious activities. D. C. S. I. was envisaged as a separate set up exclusively to cater to the needs of S. S. I. Sector. At district levels Deputy Commissioners were appointed, and in every Taluk, Industrial Extension Officers were posted. With a view to providing a new thrust for development and employment a Corporation was formed by amalgamating the Kerala State Small Industries Corporation and the Kerala Employment Promotion Corporation.

These changes were effected mainly to launch a massive New Industries Programme viz. the 'Mini Industrial Estates' (M. I. E.). The M I. E. Programme envisaged the setting up of 1,000 Mini Industrial Estates in rural areas in four years from 1975-76 to 1978-79. This programme could establish only 108 estates so far.

With the announcement of the Industrial Policy of the Government of India in December 1977, the concept of District Industries Centre originated. The District Industries Centres (D. I. Cs.) came into existence in the State by July 1978 in all the then Districts. The District Industries Centres have been conceived as a single agency for making available all financial and technical assistance, inputs and other services required to an industrial entrepreneur under one roof. The District Industries Centres act as catalysts of developments, prepare action plans for the District, formulate project profiles for entrepreneurs and conduct project viability studies. The District Industries Centres assist entrepreneurs, Government Corporations and financial institutions in implementing various supporting schemes such as seed capital assistance, financial assistance to entrepreneurs belonging to Scheduled Castes and Scheduled Tribes, investment subsidies and other incentive schemes.

Khadi & Village Industries

In order to plan and organise the development of Khadi & Village Industries the All India Khadi & Village Industries Board was established in 1953. To overcome the deficiencies felt in the effective functioning of the Board, it was felt that there was need for an organisation with sufficient financial strength. Accordingly the Khadi & Village Industries Commission Act, 1956 was passed;

pursuant to this legislation was set up in April, 1957, the statutory body called the Khadi & Village Industries Commission (K. V. I. C.). The Commission is responsible for planning, organising and implementing programmes for the development of Khadi (Cotton, Woolen and Silk) and Village Industries specified in the Khadi & Village Industries Act 1956. New industries are being included periodically to the K. V. I. C. schedule. Currently 22 industries like the processing of cereals and pulses, ghani oil, cottage match, bee keeping, village pottery, gobar gas, carpentry and blacksmithy etc. are under the commission's purview.

The various programmes and policies of the Commission are implemented through statutory organisation set up under legislation. Accordingly Kerala Khadi and Village Industries Board was constituted under the provisions of the Kerala Khadi and Village Industries Act, 1957. The major function of the Board is the organisation, development and regulation of Khadi and Village Industries recognised by the Khadi and Village Industries Commission. The Board organises co-operative societies for the development of the Khadi and Village Industries and sanctions loans and grants and provides other assistance to the co-operative societies, registered institutions and individual artisans for the development of Khadi and Village Industries. The Board which has its headquarters at Trivandrum has also district level offices. Prior to the formation of the Khadi and Village Industries Board, institution like the Kerala Sarvodaya Sangh, the Walluvanad Development Society, Kurumbranad Development Society were engaged in fostering Khadi. Besides these, a Khadi Centre was functioning in Payyannur run by the erstwhile Government of Madras. This was later taken over by the Khadi Board.

There is a Khadi Production Centre at Payyannur run directly by the Board which accounts for more than 50 per cent of khadi produced under the Board. Besides the Khadi production Centres at Payyannur the Board has taken up khadi production directly in the districts of Trivandrum, Quilon, Kottayam, Alleppey, Trichur, Palghat and Kozhikode. For accelerating the sales of khadi, the Board has set up Khadi Gramodyog Bhavans and Khadi Bhavans at the District headquarters and at important business centres. To ensure timely supply of cotton to the institutions engaged in the development of Khadi Industry, the Board has set up a cotton godown each in all the Districts. Besides organising training for spinning in the Kisan Charka as well as Amber Charka the organisation of the typical village industries such as bee keeping, gur khandsari, handpounding of paddy, soap making, cottage match industry etc., has also been undertaken.

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In 1979-80 the Board initiated a special employment programme to provide additional employment to one lakh persons within three years through Khadi and Village Industries Schemes. Employment for fifty thousand persons is expected to be provided in Khadi Industry. Another fifty thousand persons will be absorbed in eight selected village industries viz. village pottery, blacksmithy and carpentry, cottage match industry, lime industry, bee keeping industry, village oil industry and cane and bamboo industry. The main thrust of the programme is to start a khadi production centre in each panchayat, besides one or two selected village industries to provide employment to a minimum of 100 persons in each Panchayat. Sixty to sixty-five persons will be provided employment in each khadi production centre and the remaining in the selected village industries through co-operative societies of registered institutions

The total number of persons employed in the Khadi and other industries run by the Board during 1984-85 was 1.52 lakhs. The corresponding figures for the previous year was 1.45 lakhs. The total number of work sheds constructed by the Board under special employment programme increased to 334 in 1984-85 from 309 in 1983-84.

During 1984-85 Khadi cloth valued at Rs. 190.09 lakhs was produced while the corresponding figure for the previous year was Rs. 183.41 lakhs. The sales turn over of Khadi increased to Rs. 313.07 lakhs from the previous year's level of Rs. 284.23 lakhs. Production and sales turn over of village industries also recorded a slight improvement during the year. The value of production and sales turn over were Rs. 3,133 15 lakhs and 3,135.48 lakhs respectively during 1984-85 as against Rs. 2,392.18 lakhs and Rs. 2,494 89 lakhs in the previous year. During the year, Khadi and Village Industries Board gave assistance for the construction of 519 Gobar Gas Plants The number of full time workers engaged in Khadi and Village Industries in the State decreased to 84,998 during 1984-85 from 93,973 in 1983-84. The total amount of wages received by the workers also declined. An amount of only Rs. 1,065.86 lakhs was received by the workers as wages during the year under review while the wages received during the previous year was Rs. 1,127.48 lakhs. The details relating to production, sales turn over, employment and wages in Khadi and Village Industries are given in Table-8.

In order to contain the growing unemployment problem and to alleviate poverty in rural areas, the Khadi and Village Industries Programmes have been given an important place in the planning process. An outlay of Rs. 9 crores is provided in the VII Five Year Plan for the Khadi & Village Industries Board; of which Rs. 1.80 crores will be utilised for the benefit of Scheduled Castes and Tribes.

TABLE 6

Khadi and Village Industries

Production, Sales, Employment and Wages during 1984-85

Sl. No.	Industry	Production (Value Rs. in lakhs)	Sales (Value Rs. in lakhs)	Employment			Wages (Rs. in lakhs)			Total Wages (Rs. in lakhs)
				Full Time	Part Time	Casual	Full Time	Part Time	Casual	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
A.	*Khadi*	190.00	313.07	18 118	..	..	135.19	..	..	135.19
B.	*Village Industries*									
1	Village Oil	688.50	705.21	945	1,547	..	27.27	24.54	..	51.81
2	Village Pottery	312.38	325.98	10,256	327	..	181.45	25.04	..	206.49
3	Fibre and Screwpines	428.77	453.08	54,094	1,368	..	295.96	5.93	..	301.69
4	Carpentry	196.33	201.35	2,113	194	..	156.03	7.07	..	163.10
5	Handmade Paper	16.72	15.75	253	..	..	5.61	..	..	5.61
6	Gur Khandsari	121.04	134.45	1,165	538	..	13.10	3.22	..	16.32
7	Palm Gur	69.16	75.88	418	21,950	..	a	a	..	23.49
8	Bee Keeping	385.45	212.65	3,760	14,350	..	a	a	..	21.25
9	Village Leather	201.57	226.65	981	682	..	39.46	15.24	..	54.70
10	Lime	181.03	193.09	2,552	735	..	84.25	6.39	..	90.64
11	Non Edible Oil & Soap	46.84	50.76	106	190	..	2.50	1.17	..	3.67

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
12	Cottage Match	85.37	88.30	960	1,838	..	9.96	9.97	..	19.93
13	Cane and Bamboo	50.34	53.76	3,007	2,555	..	19.55	8.10	..	27.65
14	Medical Plants	5.29	5.95	23	463	..	0.24	0.29	..	0.53
15	Processing of Cereals & Pulses Industry	268.22	311.34	3,246	2,159	..	58.84	13.06	..	71.90
16	Fruit Processing & Preservation	58.31	59.33	188	191	158	a	a	..	5.07
17	Aluminium	13.77	12.97	73	..	..	0.92	..	..	0.92
18	Poly Vastra	1.06	6.03	63	..	..	0.89	..	..	0.89
19	Gobar Gas		519 Plants (constructed)							
	TOTAL FOR B (1 to 19)	3,133.15	3,135.48	84,498	48,686	158	896.03	120.02	..	1,065.86
	TOTAL (A+B)	3,323.24	3,448.55	102,616	49,688	158	1,031.22	120.02	..	1,201.05

(a): Amount not separately available. Hence the total in the last column will not tally.

Beedi Manufacturing

One of the most un-organised industries in the State, nothing is known outside about its origin. It provides employment to a sizable number. It is common knowledge that this industry can be run with meagre capital. This explains the preponderance of small units which often consist of a single self employed individual. The making of beedies is a simple process which can be mastered in about 4 to 10 months. No machinery is required. The six stages in the manufacture of beedies are the following (1) preparation and blending of tobacco (2) cutting of wrapper leaves (3) rolling of beedies and tying up (4) closing the ends (5) warming and (6) labelling and packing. The raw materials used are processed tobacco and wrapper leaves. The more popular and widely used tobacco is procured from Gujarat and Maharashtra. However to reduce production expenses, it is not unusual to blend the superior variety with inferior tobacco from Guntur. The leaves of diosporos melanoxylon are used for wrapping the tobacco.

In Cannanore District, it is estimated to employ nearly 30,000 workers. Initially the industry was run by entrepreneurs from neighbouring Mangalore region. The production was carried on a contractual basis. The employer issued a fixed quantity of raw materials and the workers were required to produce a fixed number of beedies for which low wages were paid at piece rate. The service conditions and standard of living of the workers were thoroughly unsatisfying. Highly insanitary conditions of the work place is a conspicuous feature of the industry. Beedi rolling is often done in ill-ventilated places. There are no fixed hours of work payment being on piece rate basis. Irregular employment as a result of the inclement weather and surplus stock position is another undesirable aspect. To better the prevailing conditions the State Government in 1968, enforced the Beedi and Cigar Workers Condition and Employment Act. The employer in the industry were reluctant to implement the provision of the Act in view of the increased financial commitments on their part. Several factories were closed and some shifted to neighbouring States where there was no legislative enactment safeguarding the workers interests. The Government stepped in to rehabilitate the retrenched workers under the co-operative sector. One Central Co-operative Society and twenty affiliated primary co-operative societies were formed in 1969. This is the genesis of the now well known Kerala Dinesh Beedi Worker's Central Co-operative Society. Share capital

loans and working capital loans were sanctioned by the Government in the Central Society. The Central Society admirably took over the role played by the erstwhile entrepreneurs. Bulk purchases of raw materials are effected by the Central Society. These are distributed to the primary societies. The beedies produced are then returned and marketed under the aegis of the Central Society.

The implementation of this scheme has been successful. Nearly 25,000 workers have been brought under the co-operative fold. Remunerative wage rates and several social security measures such as holidays with wages, bonus, death relief fund, sunday wages, annual leave wages, maternity benefit, provident fund, gratuity etc., have been assured to the workers. The workers are also receiving medical aid from dispensaries built exclusively for their benefit, using the beedi workers fund creating with the contribution of workers.

The Central Society has a paid up capital of Rs. 34.75 lakhs, including Rs. 19.10 lakhs by the State Government as on 30th June 1981. Total value of production during 1980-81 was to the tune of Rs. 12.13 crores and sales Rs. 12.55 crores. The turn over during 1981-82 was expected to be of the order of Rs. 14.5 crores and an increase of 15% in turnover was anticipated in 1982-83. The Society earned a net profit of Rs. 0.93 lakh before taxation and Rs. 0.65 lakh after taxation during 1980-81.

Unprecedented hike in the price of raw materials viz. beedi leaves, shortage of railway wagons transporting beedi leaves from principal producing centres in Madhya Pradesh, widespread prevalence of spurious beedi under the same brand name of 'Dinesh beedi' continue to hamper the progress of the society. The society is also adversely affected by the recent levy of Central excise on beedies with brand names which has been a serious drain on its coffers.

Match Industry

The match industry in the State comprises of two distinct groups of enterprises viz. (1) splints and veneers factories which turn out the basic, ingredients of the match the stick and box components (2) the dipping factories which treat these ingredients chemically, assemble them and finish

the product. Of these the former form the major component of the match industry meet the needs of dipping factories in Kerala as well as in Tamil Nadu. The availability of soft timber in the forests of Kerala, economic means of transport of timber along waterways and facilities for rapid dispatch of finished products, were the factors responsible for the growth of this industry in Kerala. A typical splints and veneers factory is a small unit employing about 30 to 40 workers. Larger factories employ over 200 persons. Females account for 60% of the total labour in the industry. 45% of the entire labour force is used for tray setting of veneers and splints. The main function of a splints and veneers unit is the conversion of raw timber into match sticks and veneers of appropriate sizes. Softwood such as Elavu and Palai is first cut into cylindrical pieces (cross cutting). The outer bark of these logs is removed by axing (debarking). The debarked pieces are placed on a machine where an operator assisted by a few splits it into thin leaf like sheets (peeling). Logs of Elavu are used for making veneers (components of boxes) and Palai, Mutti and Kambili for making splints. The long peeled sheets are taken up and hung aloft for drying. These are then placed one above the other and pressed into a compact column in wooden trays (veneers tray setting and splints tray setting). Inner veneers (the sheet for making inner box) and outer veneers (the sheet for outer box) are arranged separately. The dried veneers are cut into appropriate pieces on a veneer chopping machine. The outer and inner veneers are bundled separately and dispatched to dipping factories. The splint sheets are in a similar manner arranged in trays (splints tray setting) and sliced into sticks of required length. The splints are dried in the sun and levelled to weed out sub-standard sticks. These are then packed in gunny bags and taken out of the factory. Despite natural advantages, the splints and veneers industry's progress could by no means termed satisfactory. The dearth of entrepreneurial talent, inadequacy of raw materials, working capital deficiency, shrinking markets, diminishing number of dipping factories have accentuated the problem.

In the dipping factory, the process commences with frame filling which is usually done at home by women, adolescents and children. Splints are fixed in a geometrical pattern on square wooden frames which usually contain 2,500 groves (50 lathes of perforated wholes). These frames are taken to the dipping unit when they are properly levelled and

paraffined. The chemicals required for dipping are ground and mixed by qualified workers and frames are dipped with chemicals and placed for drying.

Outer boxes and inner boxes are also made in households out of the veneers supplied by the unit. Boxes are side painted and sun dried. The filling of boxes with sticks (box filling) is again the work of women and adolescents. This is followed by pasting of labels and bandrolls to the boxes. The finished matches are packed into bundles of a dozen (dozen packing) and 5 gross match boxes are again packed as a bigger bundle (Bundling). Dipping factories are obliged to provide separate accommodation for ensuing that dipped matches are under the custody of the Central Excise till these are released for sale on payment of Excise duty.

Minimum wages have been introduced in the industry since 1960. The Khadi and Village Industries Commission is also assisting some match units as a part of its programme of fostering village industry. But the scheme has not made an impact on the scene.

Tile Industry

Tile industry is one of the important traditional industry in Kerala which has grown from humble beginnings. The principal factors that have influenced the location of the industry are the availability of essential raw materials like clay and fire wood and the transportation facilities. Clay of black and yellow varieties is normally obtained from paddy fields. It is extracted after harvest season. It is stored for a year then moistened with water and mixed with river sand. Clay is moved to manufacturing centre through backwaters and canals. Firewood is procured in lorries from the adjacent forest areas. Hydro-Electric power is readily available. The earliest tile factory was established at Kozhikode in 1874 and at Quilon in 1880, not long after the first one in India founded at Mangalore in 1865, by the Basel Mission which was modelled on the French tile industry in Marseilles for the pattern of its tiles and methods of production. The workers in the industry derive the benefits of minimum wages, provident fund and Insurance schemes.

The industry provides ancillary employment from operations such as quarrying, collection and supply of firewood and

transport of tiles. 50% of the workers in this industry are women. The tiles manufactured at Calicut are known all over India under the generic name of "Calicut" and at one time were exported to Burma, Ceylon, Malaysia and even Australia. The tile factories also manufacture bricks, clay pipes, ridge tiles, flooring tiles, flower pots, ventilators, pottery ware etc. Most of the tile units are small scale units. Increasing mechanisation of the production process by introduction of modern devices worked by power such as De Airing Pug Mills, Revolving Process, Chain conveying elevators, Rg Mills has been an interesting feature of the strides towards modernisation of the Industry.

The tile industry has had a very interesting birth in India. The German Basel Mission, headed by George Plebst had come to India at Mangalore. It was in the year 1865 that the first tile factory started under the patronage of the German Basel Mission and supported by the European community. Availability of quality clay, firewood and presence of natural humid climate so necessary for drying of green tiles without cracking or warping contributed to the growth of this industry and fast expansion started.

Today it has become a major industry of Kerala. In fact Kerala is the home of tile industry in India. Out of nearly 500 units in the country, nearly 300 are situated in Kerala. It has been a source of living to nearly 25 to 30 thousand workmen of Kerala. It is one of the traditional industry, which has done yeomen service to the State's economy. The District-wise distribution is given below:

District-wise distribution of units

1.	Cannanore	25
2.	Calicut	20
3.	Malappuram	20
4.	Palghat	15
5.	Trichur	150
6.	Ernakulam	25
7.	Kottayam	5
8.	Alleppey	3
9.	Quilon	35
10.	Trivandrum	2
11.	Idukki	2
	Total	300

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The total investment, employment, and production in terms of rupees is as shown below:

Investment	Rs. 25,46,00,000
Production	Rs. 24,60,00,000
Employment	21,560.

The units are producing different number of tiles. Units produce as less as 3,000 and as large as 25,000 and more tiles a day. The various units have been clubbed in three heads

A. Units producing upto 8,000 tiles|day.

B. Units producing more than 8,000 tiles and upto 14,000 tiles|day.

C. Units producing more than 14,000 and less than 25,000 tiles per day.

Nearly 73% of the units fall in Class A. 20% in Class B and about 7% fall in Class C.

The market for tiles is local and also the States of Andhra, Maharashtra, Gujarat, and Tamilnadu. The market has been showing a downward trend for the existing tiles. The export of tiles has also reduced considerably though there are some welcome inquiries from the Gulf countries recently.

Despite changing trends in the market, the industry continued to produce traditional roofing tiles. The cost of production has also been considerably increasing. The cost of items like firewood, clay, oil wages, transportation has steadily been rising. The following figures indicate the price trend in respect of these items for 3 years since 1960 in the Trichur region alone.

Year	*Fire Wood per ton*	*Clay per cu. yd.*	*Oil per Gln.*	*Trans-portation per 1,000 tiles*	*Women's wages per head per day*	*Men's wages per head per day*
	(in Rs.)					
1960	35	5.00	3.00	7.50	1.20	1.64
1976	130	20.00	50.00	25.00	7.00	7.00
1978	140	25.00	50.00	30.00	7.66	7.66

While a century of the tile industry in Kerala has seen great expansion and provided much employment, the tile industry as it is today, is facing a state of uncertainty.

The industry had been enjoying a good market for many years. The larger units were exporting their tiles to other countries while the smaller ones catered to the home demand. Thus the industry hardly faced any competition. The position changed as the foreign countries started their own units causing the bigger units to off-load their production in the Indian Market itself. With increase in quality consciousness and due to factors like brand image the Indian market also did not fully accept the production of the non-mechanized smaller units despite the lower prices. Thus, the industry, as a whole is now passing through precarious situation where in the markets have considerably dwindled, the manufacturing costs have gone up, the firewood has become not only costly but also scarce, the freight charges have considerably increased and the quality clay itself is not so abundantly available.

Sensing the situation and realising the significance of the fact that the industry as a whole has not changed with the times but has remained contented in being a traditional industry, the Government decided to take up modernization aspects. The Small Industry Service Institute at Trichur immediately took up the programme on a priority basis.

This programme would help to identify weaker spots of the industry with a view to overcoming them. This would lead to an overall productivity improvement of the industry and would indicate ways and means for the resurgence of the industry.

Accordingly nine representative units were chosen under the modernisation programme in the major areas like Baliapattam (Cannanore), Feroke (Calicut), Pudukad, Allayanur, Korannavur (Trichur), Quilon and Trivandrum. The units were a cross section of the different types of units existing in the State.

Other aspects like research and development of the tiles, kilns, fuels, design of tiles, clay selection, product diversification, technological aspects of the entire tile making process, the export potential, the I. S. I. mark etc., etc., are to be taken up so as to ultimately bring in an era of continued growth and development for the tile industry.

(d) Industrial Potential and Plans for future development

From the view point of structural analysis, a conspicuous characteristic is that the proportion of work force engaged in agriculture is the lowest in India—the proportion having declined from 55.5% in 1971 to 50.6% in 1981, according to the census (*see* table below). Inter censal data however are not strictly comparable due to changes in the definition of "worker". Yet there had been a decline of nearly five percentage points in the proportion of agricultural work force as compared to three percentage points at the national level.

SECTORAL DISTRIBUTION OF WORKERS 1971 & 1981

Sector	*Workers*	*Percentage Change*	
	1971	1981	1971-81
Agriculture and allied industries	55.5	50.6	—4.9
Industry	18.00	19.9	+1.9
Of which manufacturing	15.8	16.1	+1.3
Construction	1.7	3.0	+1.3
Service	26.5	29.5	+3.0

Table 9

Kerala's Industrial Base 1980-81

NIC Code (2 dgt)	Industry	Employment		Value Added	
		Per cent Share in Kerala's Aggregate Factory Sector	Per cent Share in All-India Total for the Industry	Per cent Share in Kerala's Aggregate Factory Sector	Per cent Share in All-India Total for the Industry
(1)	(2)	(3)	(4)	(5)	(6)
20+21	Food products	38.96	8.34	9.39	5.19
22	Beverages	7.16	5.92	3.17	5.35
23	Textiles	6.66	1.63	7.16	2.11
24	Wool, silk. synthetic	0.73	0.92	1.05	1.09
25	Jute textiles	..	..	..	..
26	Textile products	2.04	5.66	3.40	11.13
27	Wood and products	5.14	17.47	2.61	15.94
28	Paper and products	3.54	3.60	4.99	4.49
29	Leather and leather products	..	..	..	..
30	Rubber, petroleum, etc.	2.94	3.51	9.92	6.41
31	Chemical and products	5.89	3.36	17.62	4.76
32	Non-metallic mineral	5.25	4.08	3.83	3.71
33	Basic metal and alloy	1.30	0.62	2.82	0.89
34	Metal products	1.21	1.70	0.92	1.06
35	Non-electric machinery	1.33	0.91	1.16	0.51
36	Electrical machinery	2.77	2.43	7.08	3.32
37	Transport equipment	1.77	1.02	2.31	1.05
38	Other manufacturers	0.62	2.52	1.27	3.84
40	Electricity	10.32	3.89	18.39	5.02
97	Repair services	2.26	3.99	2.12	4.75

Source: Calculation based on data from ASI 1980-81, "Summary Results for Factory Sector", CSO. 1984.

More than one half of the total industrial employment in Kerala (2.8 lakh factory workers) is accounted by food products (39%) electricity (10%) and beverages (7%). Other important sources of factory employment include cotton textiles, and textile products mainly knitting mill and coir products, chemicals and chemical products and non metallic mineral products. The position alters when industries are ranked on the basis of value added; the importance of food products declines and that of chemicals and rubber products increases significantly. The table clearly indicates that all the major industries in Kerala are still based on the natural resource endowment of the State. Engineering industries (i.e. those activities connected with metals, machinery and transport equipment) occupy a relatively small share barely 8% of the employment in manufacturing activities.

Kerala's industrial progress is hampered by the inadequate development of engineering industries, and this accounts for the fragile industrial base, which consists of a collection of inter related agro based and non-metallic mineral products. Capital goods sector comprising of basic metal and alloys, machinery and machine tools and transport equipment do not have a reasonable share. The development of engineering industries in the region is in a nascent stage wherein the domestic demand to a considerable extent is met by imports.

A heartening feature is the number of new industries springing up during the last three decades which has reduced the relative importance of some traditional industries. Yet major industries in Kerala are of traditional variety and based on the region's natural resources. Today top 10 industries, consist of cotton textile (mill sector) tea, basic chemicals, soap, rubber products knitting mills. petroleum refining. Ship building. aluminium and beedi. These top 10 together account for 50% of the total value added by the factory sector. The overall industrial base is still characterised by concentration rather than diversification. A major effort to accelerate industrialisation with a diversified structure is necessary and a *sine qua non* for the economic growth of Kerala.

Table 10

Organisational Pattern of Investment in large and Medium Industries in Kerala as on 1983

Industry	Central Sector		State Sector		Joint Sector		Co-operative Sector		Private Sector		Total	
	(Rs.)	Per cent	(Rs.)	Per cent	(Rs.)	Per cent	(Rs.)	Per cent	(Rs.)	Per cent	(Rs.)	Per cent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1. Agro-based	96 (0.15)	0.94	567 (3.95)	5.55	148 (8.25)	1.45	677 (47.85)	6.63	8,720 (22.39)	85.42	10,208 (8.56)	100.00
2. Forest	14,159 (22.58)	63.40	226 (1.56)	1.02	292 (16.28)	2.30	..	..	7,657 (19.65)	34.28	22,334 (18.73)	100.00
3. Marine	..	..	..	..	..	..	..	..	50 (0.13)	100.00	50 (0.04)	100.00
4. Mining/Mineral	796 (1.26)	36.07	600 (4.16)	27.19	272 (15.18)	12.32	..	..	539 (1.39)	24.42	2,207 (1.85)	100.00
5. Textiles	1,270 (2.02)	11.70	1,412 (9.80)	13.02	161 (8.98)	1.49	704 (49.75)	6.49	7,302 (18.75)	67.30	10,849 (9.10)	100.00
6. Chemicals	30,085 (48.00)	73.52	5,767 (40.00)	14.10	765 (42.66)	1.87	34 (2.40)	0.08	4,268 (10.95)	10.43	40,919 (34.31)	100.00
7. Electronics/ Electrical	1,031 (1.65)	9.50	4,618 (32.03)	42.57	155 (8.65)	1.43	..	..	5,045 (12.95)	46.50	10,849 (9.10)	100.00
8. Engineering	15,254 (24.33)	69.83	1,224 (8.49)	5.60	..	..	..	..	5,368 (13.79)	24.57	21,846 (18.32)	100.00
All total:	62,690 (100.00)	52.56	14,414 (100.00)	12.07	1,793 (100.00)	1.50	1,415 (100.00)	1.20	389.449 (100.00)	32.66	119,262 (100.00)	100.00

Note:—Figures in parenthesis are percentages

Source:— Based on Table VII-3, Report of the High Level Committees on Industry, Trade and Power, Vol. I, State Planning Board, Trivandrum, 1984.

APPENDIX

Modern Food Industries (India) Ltd.

(Edappally Unit)

(a) Installed Capacity, Production and of Capacity Utilisation

Name of Product	*Unit*	1977-78	1978-79	1979-80	1980-81	1981-82
Modern Bread	Lakh.					
Installed Capacity	Nos. of 400 gm	123.00	123.00	123.00	123.00	123.0
Production	,,	83.6	136.5	170.4	181.2	194.8
Capacity Utilisation (Per cent)	..	67.9	110.9	138.5	147.3	158.4
Modern Bun	Lakh					
Installed Capacity	No. of 50 gm.	47.66	47.66	47.66	47.66	47.66
Production	,,	24.37	6.30	6.90	8 00	7.70
Capacity Utilisation (Per cent)	..	51.10	13.20	14.40	16.90	16.20

APPENDIX

Modern Food Industries (India) Ltd.,

(Edappally Unit)

(Value Rs. in lakhs)

	Item	Unit	1980-81 Quantity	1980-81 Value	1981-82 Quantity	1981-82 Value
	(1)	(2)	(3)	(4)	(5)	(6)
1.	Maida	Lakh Kg.	50.68	94.96	53.87	105.75
2.	Sugar	..	7.29	26.85	5.11	32.59
3.	Yeast	Tonnes	59.86	5.69	58.15	8.02
4.	Salt	,,	68.20	0.55	77.93	0.67
5.	R.G.O.	..	53.17	6.38	71.23	11.50
6.	Wrapper	,,	143.66	23.17	129.8	25.58
7.	G.M.S.	,,	.	.	10.39	2.08
8.	Calcium Propionate	..	..	..	11.31	1.87
9.	Vitamin Premix	..	..	..	2.02	1.50
10.	Soya Flour	,,	..	..	35.15	1.25
11.	Other Chemicals	,,	..	..	5.05	0.60

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APPENDIX

Hindustan Latex Limited

(a) Installed Capacity, Production and Rate of Capacity Utilisation

Name of Product	Unit	Installed Capacity					Production					Capacity Utilisation (in percentage)				
		1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1. Condoms	Million Pieces	288	288	288	288	288	163	183	178	105	266	56.6	63.5	61.7	36.5	92.0
2. Meteorological Balloons	'000 Nos.	..	12	..	25 to 30	25 to 30	3.56	4.75	..	..	..	..	39.6	..	..	..

APPENDIX

Hindustan Latex Limited

(b) Consumption of Raw Materials

(Value Rs. in lakhs)

Raw Materials Consumed	Unit	1977-78		1978-79		1979-80		1980-81		1981-82	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Rubber Latex	M.T.	557	37.24	615	54.58	625	63 8	390	46 35	789	108.75
2. Ammonia Gas	,,	17	0 77	18	0.83	16	1.02	9	0 64	14	1.07
3 Aluminium Hydroxide	..	21	0 37	21	0.45	14	0.32	12	0.31	24	0.60
4. Preosil	..	23	2.06	20	1 68	23	2.42	4	0.51	5	0.62
5. Nipoil	,,	2	0.44	8	1.44	..	..	..	..	..	..
6. HDTMA	..	3	0 90	4	1.13	2	0.73	2	0.60	3	1.24
7 Xerofil	,,	15	1 67	17	1.90	5	0 64	13	1.71	39	6.12
8. Bical-D	,,	27	0.59	30	0.78	49	1.43	31	1.04	45	1.70
9. Other Raw Materials	..	..	4 60	..	5.90	..	10.58	..	6.67	..	14.28

APPENDIX

The Travancore Sugars & Chemicals Limited

(a) Installed Capacity, Production and rate of Capacity Utilisation

Name of Product	Unit	Installed Capacity					Production				
		1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82
(1)	2	(3)	4	(5)	6	(7)	8	(9)	10	(11)	(12)
1 Sugar		900 Tonnes Cane day	900 Tonnes Cane day	900 Tonnes Cane day	900 Tonnes Cane day	900 Tonnes Cane day	4272 Tonnes bagged	5764 Tonnes bagged	4363 Tonnes bagged	3334 Tonnes bagged	2820 Tonnes bagged
2 Spirit	Lakh proof Litres	27.0	27.0	27.0	27.0	27.0	16.6 (61.5)	17.6 (65.1)	20.7 (76.8)	17.9 (66.3)	17.4 (64.6)
3. Arrack	„	..	..	..		..	33.6	41.1	38.1	27.3	26.5
4. Indian Made Fine Liquors	..	..	..	..	.	..	1.4	0.9	1.0	0.7	0.3
5. Molasses	MT	.		..	..	.	2668	4221	2883	2001	2098

Note: Figures in brackets indicate the percentage of Capacity Utilisation.

APPENDIX

Travancore Sugars & Chemicals Limited

(b) Consumption of Raw Materials

(Value in Rs. lakhs)

Raw materials Consumed	Unit	1977-78		1978-79		1979-80		1980-81		1981-82	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1	(2)	3	4	(5)	6	(7)	(8)	(9)	(10)	(11)	(12)
1. Sugarcane	Tonnes	56510	58 39	79788	79 72	60691	75 86	43150	73.30	43020	73 13
2 Sugarcane from own farm	..	304		278		.	..	..	..		..
3 Molasses	..	1629	4 66	2495	5 89	975	3.47	2505	12 32	2075	16.49
4. Molasses own	..	3071	.	2581	.	4443	0.07	2305	0.64	800	0 25
5. Outside Spirit for Arrack	Lakh Proof Litres	20 1	22 37	15 4	27 35	20 00	30 23	10 4	23.18	10 0	27 18
6 Own Spirit for Arrack		13 5		15 7	..	18 1	..	17.0	..	16.5	..
7. Own Spirit used for Indian made Fine Liquors	.	1.6		0 9	.	1 0	..	0.7	..	0 3	..
8 Others	.	.	0 68	.	0.73	.	0 82	..	0.70	..	0 89
9. Jaggery	Tonnes	..	..			..	..	52	1 81	1209	36.55

Foam Mattings (India Ltd.

a. Installed Capacity, Production & Rate of Capacity Utilisation

Year	*Unit*	*Installed Capacity*	*Production of Foam Backed Mattings*	*Capacity Utilisation (in Percentage)*
1979-80	Sq. Mts	3.6 Million	Trial	.
1980-81	.	3.6	33214	0.9
1981-82	.	3.6	2.20 lakhs	6.1

b. Consumption of Raw Materials

(Value in Rs. lakhs)

Raw Materials Consumed	*Unit*	1979-80		1980-81		1981-82	
		Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
1	2	3	4	5	6	7	8
1. Coir Mattings	Sq. Mts	27347	4.79	33214	6.11	2.20 (lakhs)	40.00
2. N. R. Latex	Litres	16225	1.37	18375	1.77	1.05 lakhs)	14.70
3. Coir Yarn	Kgs	.	..	13110	0.88	..	..
4. Others	.	.	1.48	..	0.92	..	9.31
5. Light Diesel Oil	Litres	..	..	..	..	60000	1.59

APPENDIX

Trivandrum Rubber Works Limited

(a) Installed Capacity. Production and Rate of Capacity Utilisation

Name of Product	Unit	Installed Capacity 1977-78	1978-79	1979-80	1980-81	1981-82	Production 1977-78	1978-79	1979-80	1980-81	1981-82
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1 Cycle Tyres	Lakh Nos.	15	15	15	15	15	3 47 (23 1)	5 65 33.7)	5 38 (35 9)	4 80 (32 0)	6.94 (46.3)
2. Cycle Tubes	,,	18	18	18	18	18		0 18 (1 0)	0 46 2 5)	.	.
3. Hoses	Mtr.	N F.	N. F.	N F.	N F	N F	7276	26010	20491	..	12973
4 Sheetings	M. T.	,,	..	..	..	..	253	588	511	444	613
4. Camel Back	,,	,,	,,	,,	..	,,	208	172	318	330	451
6. Rims	Lakh Nos.	3	3	3	3	3	1 03 (34 2)	3 16 105 2	3 23 107 6	3 73 (124 5)	2.95 (98 4)
7 Cycles	Nos.	N. F.	N. F	N. F.	N. F.	N. F.	277	297	381	273	195
8. Latex Goods	M T.	,,	,,	,,	,	,,	64 0	65 9	86 7	98 5	85.5
9. Flaps	Nos.	..	..	..	..	..	..	..	..	947	3038

Note: (i) Figures in the brackets give the percentage of Capacity Utilisation.
(ii) N. F.—Not Fixed.

APPENDIX

Trivandrum Rubber Works Limited

(b) Consumption of Raw Materials *(Value Rs. in lakhs)*

Raw Materials Consumed	*Unit*	1977-78 *Quantity*	1977-78 *Value*	1978-79 *Quantity*	1978-79 *Value*	1979-80 *Quantity*	1979-80 *Value*	1980-81 *Quantity*	1980-81 *Value*	1981-82 *Quantity*	1981-82 *Value*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Raw Rubber	M.T.	414	24.94	631	46.60	753	67.43	712	70.77	879	108.87
2. Carbon Black	,,	95	6.27	82	5.16	124	11.18	134	17.13	174	27.37
3. Bead Wire	Lakh Nos	7.27	2.54	12.27	4.27	11.57	7.28	10.45	5.24	15.13	8.68
4. Zinc oxide & Hydroxide	M.T.	16	1.30	21	1.52	25	2.23	25	2.25	30	3.30
5. China Clay	,,	106	0.39	109	0.48	66	0.96	111	0.68	130	0.89
6. Cord Fabric	,,	39	9.17	65	14.59	144	14.68	57	12.97	81	22.83
7. Korah	Km.	27	0.55	74	1.45	63	1.22	53	1.07	86	1.68
8. Solvent Oil	KL.	8.3	0.34	20.6	0.88	19.8	0.91	14.4	0.75	18.4	1.18
9. Whitening Powder	M.T.	145	0.43	323	1.25	291	0.99	254	1.02	312	1.30
10. Accelerators	,,	4	1.66	6	2.18	7	3.16	5	2.67	6	4.21
11. Antioxidents	,,	4	1.26	2	0.79	4	1.55	4	1.86	4	2.90
12. Steel Strips	,,	140	6.05	406	20.47	412	23.79	535	33.54	457	32.45
13. Nickel	,,	3	2.35	7	4.35	7	3.92	8	6.67	7	6.27
14. Chromic Acid	,,	1	0.25	3	1.26	3	1.04	2	0.57	3	0.74

APPENDIX

Vanjinad Leathers Ltd.

(a) Installed Capacity Production & Rate of Capacity Utilisation

Name of Product	Unit	Installed Capacity				Production				Capacity, Utilisation (in percentage)			
		1978-79	1979-80	1980-81	1981-82	1978-79	1979-80	1980-81	1981-82	1978-79	1979-80	1980-81	1981-82
1. Cow and Buffalo hide	Pieces	1.5 lakhs	1.5 lakhs	1.5 lakhs	1.5 lakhs	27759	54213	9434	Nil	18.5	36.1	6.3	..
2. Goat/Sheep Skins	Pieces	3.0 lakhs	3.0 lakhs	3.0 lakhs	3.0 lakhs	55161	Nil	10 pieces	Nil	18.4	..	..	.

(b) Consumption of Raw Materials

(Value Rs. in lakhs)

Raw materials Consumed	Unit	1978-79		1979-80		1980-81	
		Quantity	Value	Quantity	Value	Quantity	Value
1. Goat Skins	Nos.	41334	14.14	10	0.01	..	..
2. Cow hides	"	32369	19.22	64109	47.51	1000	0.78
3. Buffalo hides	"	888	0.41	306	0.29	10	0.01
4. Chemicals	..	..	9.76	..	18.08	..	1.92

APPENDIX

Laxmi Starch Limited

(a) Installed Capacity, Production and Rate of Capacity Utilisation

Year ending 30th June

Name of Product	Unit	Installed Capacity					Production					Capacity Utilisation (in percentage)				
		1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1. Starches	'000 M.T.	63.9	63 9	63 9	63 9	63.9	24.6	24.1	23 5	29.1	35 4	38 5	37 8	36 8	45.5	55.4
2. Glucose	,,	9.1	9 1	9 1	12.8	12.8	3.6	8 5	4.9	10.6	17 0	39 5	93.2	53 8	82.8	132.8
3. Cattle and Poultry feeds	,,	12.0	12 0	12 0	12.0	12 0	1 5	1.0	1 1	1 1	1 8	12 5	8.7	9 0	9.0	15 4

(b) Consumption of Raw Materials

(Value in Rs. lakhs)

Raw Materials Consumed	Unit	1977-78		1978-79		1979-80		1980-81		1981-82	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Tapioca	M.T.	32224	172.20	41248	200.06	39135	278.33	49157	247.61	46490	333.63
2. Maize	,,	16241	202.79	15653	184.84	18947	201 73	88637	356 85	35842	535.23
3 Other Items (each item less than 10% of the total)	..	..	9.58	..	9 34	..	10 96	..	2.64	..	4.5

APPENDIX

Premier Tyres Limited

(a) Installed Capacity, Production and Rate of Capacity Utilisation

Year ending 30th June

Name of Product	*Unit*	*Installed Capacity*					*Production*					*Capacity Utilisation (in Percentages)*				
		1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1. Automotive Tyres	Lakh Nos.	4.6	4.6	4.6	4.6	6.0	2.1	2.7	2.2	3.1	3.6	45.9	57.6	48.9	76.0	59.5
2. Automotive Tubes	..	4.6	4.6	4.6	4.6	6.0	1.4	2.0	1.3	2.1	2.4	30.1	43.2	29.3	44.7	40.7

(b) Consumption of Raw Materials

(Value Rs. in lakhs)

Name of Raw Material	*Unit*	1977-78		1978-79		1979-80		1980-81		1981-82	
		Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
(1)	(2)	3	4	5	6	7	8	9	10	11	12
1. Rubber	M.T.	3924.8	314.42	4435.9	504.50	3273.0	363.50	5075.2	674.87	6450.8	1001.46
2. Fabrics	..	925.8	325.39	990.8	382.47	802.9	359.59	1105.3	608.81	1411.8	858.73
3. Chemicals	..	798.5	109.74	913.5	127.76	702.5	110.36	1098.9	198.33	1392.6	297.56
4. Carbon black	..	..	..	..	..	..	..	1917.7	230.73	2422.1	361.21
5. Others	..	..	154.54	..	189.91	..	163.77	..	350.90	..	125.17

APPENDIX

Kerala Solvent Extractions Ltd.

(a) Installed Capacity, Production and Rate of Capacity Utilisation

Year ending 31st December

Name of product	Unit	Installed Capacity 1977	1978	1979	1980	1981	Production 1977	1978	1979	1980	1981	Capacity Utilisation (in percentage) 1977	1978	1979	1980	1981
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1. Oil	'000 M.T.	12	12	12	12	12	0.81	0.81	1.04	1.26	1.15	82.9 (Oil and Oil Cake)	81.4 (Oil and Oil Cake)	85.7 (Oil and Oil Cake)	112.5 (Oil and Oil Cake)	106.4 (Oil and Oil Cake)
2. Oil Cake	,,						9.14	8.96	9.24	12.25	11.62					
3. Cattle feed	,,	15	15	15	15	15	3.43	8.39	13.04	14.61	17.52	22.9	55.9	87.0	97.4	116.8

(b) Consumption of Raw Materials

(Value Rs. in lakhs)

Raw materials Consumed	Unit	1977 Quantity	1977 Value	1978 Quantity	1978 Value	1979 Quantity	1979 Value	1980 Quantity	1980 Value	1981 Quantity	1981 Value
1. C.N. Cake	'000 M.T.	9.68	151.07	9.55	150.67	12.46	185.85	15.09	313.44	13.93	307.22
2. Other Oil cakes	,,	0.73	9.59	2.19	24.09	2.47	31.78	2.71	39.86	4.70	90.12
3. Others	.		13.11	.	25.71	..	43.34	..	44.46	.	60.63

APPENDIX

Apollo Tyres Limited

(a) Installed Capacity, Production and Rate of Ca . . Utilisation

Name of Product	Unit	Installed Capacity					Production					Capacity Utilisation (in percentage)				
		1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1. Automobile Tyres	Lakh Nos.	4.2	4.2	4.2	4.4	4.4	1.7	1.8	2.4	1.7	2.4	40.5	42.3	56.4	37.9	55.5
2. Automobile Tubes	,,	4.2	4.2	4.2	4.2	4.2	0.3	0.7	1.8	1.2	1.3	6.4	15.5	42.5	29.1	31.8
3. Automobile Flaps	,,	..	..	..	..	..	0.4	0.8	1.2	0.9	0.9	..	..	..	..	..
4. Camel back Retreading Materials	Hundred Tonnes	30	30	30	30	30	..	..	0.3	0.8	0.3	..	..	1.1	2.8	1.1

APPENDIX

Apollo Tyres Limited

(b) Consumption of Raw Materials

(Value Rs. in lakhs)

Raw Materials Consumed	Unit	1977-78		1978-79		1979-80		1980-81		1981-82	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Rubber	M.T.	2732	248.02	2961	341.49	4190	535.42	3142	471.01	4689	785.01
2. Fabric	..	723	286.32	778	362.82	1139	640.84	751	482.79	1113	735.88
3. Carbon Black	..	1268	77.66	1493	99.16	2094	222.05	1489	194.97	2308	315.21
4. Chemicals	.	693	102.28	795	116.43	1184	198.42	847	157.64	1335	259.01
5. Others	..	.	65.05	..	61.63	..	117.41	..	113.43	..	114.35

APPENDIX

Mc Dowell and Company Limited

(a) Installed Capacity, Production and Rate of Capacity Utilisation

Name of Product	*Unit*	*Installed Capacity*					*Production*					*Capacity Utilisation (in Percentage)*				
		1977	1978	1979	1980	1981	1977	1978	1979	1980	1981	1977	1978	1979	1980	1981
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1. Potable Alcohol	K.L.	8185	8185	8185	8185	8185	6003	7181	8265	11086	15100	73 4	87.7	101.0	135.4	184.5
2. Other Alcohol	,,	..	..	..		..	5	..	..	..	..	..	..	..	..	..
3. Ethyl Alcohol	,,	..	..	..	.	9988	..		..	..	5529	..	..	..	..	56.1
4. Styrene	M.T.	..	..	..	..	10,000	..	..	..	..	7713	..	..	..	..	77.4
5. Poly Styrene	,,	..	..	.	..	7500	..	.	..	..	5982	..	.	..	.	79.8

(b) Consumption of Raw Materials

(*Value Rs. in lakhs*)

Raw Materials Consumed	*Unit*	1977		1978		1979		1980		1981	
		Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Jaggery	MT.	3439	48 66	2478	26 54	2236	39.80	3509	124.57	4394	131.65
2. Grapes	MT.	2279	38.26	733	13.16	687	11.65	834	14.13	1658	34.86
3. Spirit	KL.	738	17.77	807	20.52	1261	28.25	1595	38.09	3578	173.56
4. Malt	MT.	481	11.44	918	32.57	1104	34.44	611	20.43	1217	41.21
5. Molasses	,,	2287	7.23	8198	15.59	10554	24.45	10047	21.72	35728	173.98
6. Other Raw Materials	..	..	11.45	..	16 58	..	16.09	..	23.56	..	867.09

APPENDIX

(a) Installed Capacity, Production & Rate of Capacity Utilisation

Name of Product · Beer.

Year	*Unit*	*Installed Capacity*	*Production*	*Capacity Utilisation (in Percentage)*
(1)	(2)	(3)	(4)	(5)
1977	HL.	50.000	19983	40.0
1978	..	50.000	30713	61.4
1979	..	50 000	55331	110.7
1980	,,	50.000	54276	108 6
1981	,	50,000	59830	119 7

(b) Consumption of Raw Materials

(*Value Rs. in lakhs*)

Names of Raw Material	*Unit*	1977		1978		1979		1980		1981	
		Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Malt	MT.	378.7	10.90	522.5	16.29	856.9	25.44	813.7	27.39	933.4	31.57
2. Other Brewing material	,,	23.5	0.44	93.1	4.61	121.4	8.01	149.1	8.93	143.9	10.06

APPENDIX

Fibre Foam Private Limited

(a) *Installed Capacity and Production*

Year	*Installed Capacity*	*Production of Fibre products (tonnes)*
1977	80 lbs/h	140.0
1978	80 lbs/h	181.6
1979	80 lbs/h	289.7
1980	80 lbs/h	201.9
1981	80 lbs/h	128.3

(b) Consumption of Raw Materials

(*Value Rs. in lakhs*)

Raw Materials Consumed	*Unit*	1977		1978		1979		1980		1981	
		Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Husks	MT.	88	1.52	..	..	..	..	..	..	..	..
2. Fibre	,,	105	6.17	146	2.24	250	5.01	175	5.14	131	3.32
3. Latex	KL.	11	0.97	130	9.03	168	16.39	103	10.70	62	7.77
4. Chemicals & Covering Materials	..	.	5 18	..	8.12	..	14.37	..	13.25	..	7.63

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APPENDIX

Forest Industries (Travancore) Limited

(a) Installed Capacity, Production and Rate of Capacity Utilisation

Name of Product	Unit	Installed Capacity					Production					Capacity Utilisation (in Percentage)				
		1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Wooden Furniture	Man hours	726000	726000	1500 (Cu.m)	1500 (Cu m)	1500 (Cu m.)	241316	274368	799 (Cu m.)	1156 (Cum.)	1437 (Cum.)	33.3	37.8	53.3	77.1	95.8
ASCU Treatment Plant	Poles	..	..	7500	7500	7500	..	..	1496	2185	4416	..	..	19.9	29.1	58.9

(b) **Consumption of Raw Materials**

Year	*Value (Rs. in lakhs.) of logs issued to Saw Mills*
1977-78	11.88
1978-79	7.56
1979-80	16.24
1980-81	27.54
1981-82	32.37

APPENDIX

Travancore Plywood Industries Limited

(a) Installed Capacity, Production & Rate of Capacity Utilisation

Year	*Unit*	*Installed Capacity*	*Production of Plywood and Allied Articles*	*Capacity Utilisation (in Percentage)*
(1)	(2)	(3)	(4)	(5)
1977-78	Lakh Sq. Mtrs.	27.38	10.01	36.6
1978-79	„	27.38	9.50	34.7
1979-80	„	27.38	12.62	46.1
1980-81	„	27.38	13.15	48.0
1981-82	„	27.38	12.32	45.0

(b) Consumption of Raw Material

(*Value Rs. in lakhs.*)

Name of Raw Material	*Unit*	1977-78		1978-79		1979-80		1980-81		1981-82	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Poly-formation	Tonnes	148 5	9.12	137.0	8.06	142.5	9.12	88 0	6.86	23.0	2.04
2. Acrolite	„	25 8	2.87	21 1	2 16	20.9	2.42	67 6	9.97	51.2	7 98
3. Keepol DP-II	„	21.0	1 30	4.0	0 25		..	.	.	.	..
4. Phenol	„	48 5	5 20	45 0	4.73	41 3	6.29	44.0	7.27	81.0	13.22
5. Other resins	„	.	3 79	104.1	3.10	162 4	7 11	121.4	6.77	238 0	13.51
6. Softwood Timber	'00 M3	102 6	28 13	86 7	26 76	108 8	35.43	116 9	54.33	131 7	72.23
7. C.P. Teak Veneers	'00M2	1708.4	16 64	40 9	0 38	..	..	..	.	..	..
8. Other Timber & Veneers	..	..	2 87	..	0 15	.	2 43	..	1.60	..	2.56

APPENDIX

Veeners & Laminations India Limited

(a) Installed Capacity, Production & Rate of Capacity utilisation

(Year ending June 30)

Year	*Installed Capacity*	*Production of Wood Veneers*	*Capacity Utilisation (in percentage)*
(1)	(2)	(3)	(4)
1977-78	21 lakhs Sq. M.	6.62 lakh Sq. M.	31.5
1978-79	36 ,,	7.39 ,,	20.5

(b) **Consumption of Raw materials**

Year	*Quantity of Timbers Consumed (CU. M)*	*Value (Rs. in lakhs.)*
(1)	(2)	(3)
1977-78	847.17	46.69
1978-79	694.96	45.07

APPENDIX

Punalur Paper Mills Limited

(1) Installed Capacity, Production & Rate of Capacity Utilisation

Year	*Unit*	*Installed Capacity*	*Production of writing paper*	*Capacity Utilisation (in percentage)*
(1)	(2)	(3)	(4)	(5)
1977-78	'000 Tonnes	50	8.8	17.6
1978-79	,,	50	13.1	26.2
1979-80	,,	50	12.4	24.9
1980-81	,,	50	10.3	20.5
1981-82	,,	50	10.7	21.4

APPENDIX

Punalur Paper Mills Ltd.

(b) Consumption of Raw Materials

Raw Materials Consumed	Unit	1977-78 Quantity	1977-78 Value	1978-79 Quantity	1978-79 Value	1979-80 Quantity	1979-80 Value	1980-81 Quantity	1980-81 Value	1981-82 Quantity	1981-82 Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Reeds	Tonnes	33528	51 18	12362	68 73	41947	75.21	38026	83.23	41195	105.97
2. Bamboo and Wood	,,	18	0 02	11767	8 64	..	..	..	..	.	..
3. Waste Paper & Rags	,,	1223	16.02	299	3 31	1139	17.93	1119	21.67	1008	23.33
4. Wood Pulp	,,	53	1 09	336	7 02	9367	37.63	5108	43.07	4586	35.63
5. Caustic Soda	,,	2432	48.95	4319	102.48	3386	107.98	2373	91.79	26000	124.67
6. Sodium Sulphide/ Sulphur	,,	101	1 48	312	3 33	188	3.44	89	1.79	69	1.60
7. Quick Lime etc	,,	1682	8.85	2123	11.32	2834	13 45	2676	15.48	3051	21.66
8. Bleaching Chemicals	,,	299	2 44	170	1 40	305	2.60	384	3.47	523	4.75
9. Loading Chemicals	,,	470	2 35	58	3 05	251	5.76	215	1.68	488	2.21
10. Sizing Chemicals	,,	717	12 66	1145	22 84	1155	28.94	1095	26.09	1147	30.11
11. Colouring Chemicals		11	7.24	17	10 75	1212	6.92	13	10 11	10	7.40

APPENDIX

The Western India Plywoods Limited

(a) Installed Capacity Production & Rate of Capacity Utilisation.

Year ending 31st March.

Sl. No.	Name of product	Unit	Installed Capacity					Production					Capacity Utilisation (in Percentage)				
			1978	1979	1980	1981	1982	1978	1979	1980	1981	1982	1978	1979	1980	1981	1982
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1.	Plywood	Million Sq. Mtrs.	3.5	3.5	3.5	3.5	3.5	1.94	2.13	1.76	1.65	1.97	55.4	65.7	48.6	47.1	56.3
2.	Hard board	M.T.	7500	7500	20000	20000	20000	9665	8238	9956	16172	16709	128.9	109.8	49.8	80.9	83.6
3.	Densified wood	,,	2000	2000	2000	2000	2000	1000	1081	890	860	1098	50.0	54.1	44.5	43.0	54.4
4.	UF&PF Resins	,,	2400	2400	2400	2400	2400	1148	1134	954	1030	1126	47.9	47.2	39.8	42.9	46.9
5.	Resorcinol Formaldihyde	,,	50	50	50	50	50	1.09	0.42	0.27	0.29	0.29	0.4	0.8	0.5	0.6	0.6
6.	Furniture	'000 Nos.	32	32	32	32	32	11.1	11.5	14.6	29.0	23.8	34.6	36.0	45.5	90.6	74.4
7.	Glass Reinforced Plastics	M.T.	..	800	800	800	800	.	0.05	0.56	1.40	15.6	..	..	0.1	0.2	2.0
8.	Diallyphthalate Resins Moulding Compositions	,,	600	100	100	100	100	0.01	1.40	0.37	0.50	0.50	..	1.4	0.4	0.5	0.5
9.	Mononer	,,	..	..	150	150	150	..	..	0.24	1.00	..	..	..	..	2.7	..

APPENDIX

Western India Plywoods Ltd.

(b) Consumption of Raw Materials

(Value Rs. in lakhs)

Sl. No	Raw Materials Consumed	Unit	1977-78		1978-79		1979-80		1980-81		1981-82	
			Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	Timber	Cu. M.	14902	108 66	1941	125 56	17208	117.00	15208	180 33	18676	180.83
2.	Veneers	'000 Sq. Mtr.	2035	45.45	1331	22.88	191	29 95	279	33.14	264137	41.83
3.	Firewood	M.T.	20116	15 58	18921	21.23	26869	47 83	41925	59.58	41477	66.14
4.	Phenol	,,	387	41.17	389	41.44	313	46.16	352	57.33	380	62.42
5.	Formaldehyde	,,	681	16.06	692	17.01	590	19 56	622	27.23	680	29.86
6.	Other Chemicals	..	..	8.92	..	10.39	..	9.73	..	11.98	..	30.25

APPENDIX

The Travancore Rayons Limited

(a) Installed Capacity, Production and Rate of Capacity Utilisation

Name of Product	Unit	Installed Capacity					Production					Capacity utilisation (in percentage)				
		1977	1978	1979	1980& 81	1982	1977	1978	1979	1980& 81	1982	1977	1978	1979	1980& 81	1982
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1. Rayon Yarn	M.T.	3300	3300	3300	N.A.	4200	2234	2310	1991	N.A.	Nil	67.6	70.0	60 9	..	..
2. Cellulose Film	,,	4000	4000	4000	,,	4000	2740	2965	3132	,,	1069	68.5	74.1	78.3	..	26.7
3. Cotton Linter Pulp	,,	7200	7200	7200	,,	7200	1856	2083	1974	,,	846	25.8	28.9	27.4	..	11.8
4. Sulphuric Acid	,,	18288	18288	18288	,,	18288	9749	8619	1023	,,	1463	53.3	47.1	5.6	..	8.0
5. Carbon disulphide	,,	3210	3210	3210	,,	3210	1858	1853	1952	,,	485	57.9	57.7	60.8	..	15.1

APPENDIX

Travancore Rayons Ltd.

(b) Consumption of Raw Materials

(*Value Rs. in lakhs*)

Sl. No.	Name of the Product	Unit	1977		1978		1979		1980&81		1982	
			Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1.	Caustic Soda	M.T.	4469	89.69	4574	107.11	4711	137.02	N.A.	N.A.	771	38.52
2.	Wood Pulp	,,	3841	191.20	3877	207 84	4046	241.41	,,	,,	582	44.09
3.	Sulphur	,,	5204	34.69	4822	38 01	5593	42 95	,,	,,	845	13.54
4.	Sulphuric acid	,,	680	1.95	..	..	..	..	,,	,,	,,	,,
5.	Cotton Linter	,,	3019	53.26	3722	97 73	3542	80.81	,,	,,	947	19.96
6.	Other basic raw materials like Wood Charcoal, Chlorine etc.	,,	..	8.51	..	9.14	..	19.25	,,	,,	..	85.27
7	Finishing Materials	,,	..	81.81	..	82.35	..	88.47	,,	,,	..	..
8.	Coating Materials	,,	..	56.36	..	62.37	..	83.30	,,	,,	..	..

APPENDIX

The Gwalior Rayon Silk Manufacturing (Wvg.) Company Limited

(a) Installed Capacity, Production and Rate of Capacity Utilisation

Name of Product	*Unit*	*Installed Capacity*					*Production*					*Capacity Utilisation (in percentage)*				
		1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82	1977-78	1978-79	1979-80	1980-81	1981-82
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1 Viscose Staple Fibre (At Nagda & Mavoor)	'000 Tonnes	78	78	78	78	78	75.1	84.0	73.5	76 6	75.8	96.3	107.7	94.2	98.2	97.2
2. Rayon Grade Pulp at Mavoor	"	72	72	72	72	72	38.8	27.9	45.2	45.9	45.8	53.9	38.8	62.8	63.7	63.7

APPENDIX

The Gwalior Rayon Silk Manufacturing (Wvg.) Company Ltd.

(b) Consumption of Raw Materials

(*Value Rs. in lakhs*)

Raw Material Consumed	Unit	1977-78		1978-79		1979-80		1980-81		1981-82	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1 Pulp wood	Tonnes-M	336093	596.02	262357	580 78	348053	995 91	340525	1348 31	341200	2095 00
2 Dissolving Pulp	Tonnes	86864	4131.83	98536	4827 48	88822	4787 32	93027	5407 87	93073	6425.00
3 Caustic Soda	,,	58333	1064 38	65378	1403.17	61844	1821 85	64491	2410.43	65566	2984.00
4 Sulphur	,,	37900	277 23	43504	381.20	38743	662 61	40803	793.86	41483	895.00
5 Salt	,,	71933	101 27	62811	107.29	70480	129.01	63086	131 76	52727	115.00
6 Man Made Fibre Yarn	'000 Kgs.	1571	1430.07	1771	1612.16	1367	1858.06	1897	1886.23	1978	2170.00
7 Cotton Yarn	,,	15	2 87	14	2.37	..	..	..	..	..	..
8 Grey Cloth	'000 Mtrs.	1094	239.19	1315	295.64	1550	382.44	707	168.86	645	164.00
9 Cotton & Man Made Fibres	'000 Kgs.	1644	418.51	1980	665.51	1960	842.84	2354	1036.68	2416	1310.00
10 Steel plate, sheet etc.	Tonnes	1610	46 80	1410	45.25	1122	55.23	1255	58.82	1192	57.00
11 Paper Cuttings	,,	1985	31 07	1574	37 51	2446	74 29	1923	59.74	784	25.00
12 Others	,,	..	907 79	..	1136 62	..	1273 79	..	1537.95	..	1758.00

APPENDIX

Southern Veneers and Wood Works Limited

(a) Installed Capacity, Production & Rate of Capacity Utilisation

Year	*Unit*	*Installed Capacity*	*Production of Veneers*	*Capacity Utilisation (in percentage)*
1977-78	'000 Sq. M.	836	483	58.9
1978-79		836	455	[illegible]
1979-80	,,	1528	316	20.7
1980-81	,,	1528	419	27.4

(b) Consumption of Raw Materials

Year	*Unit*	*Quantity of Timber Consumed*	*(Value Rs. in lakhs)*
1977-78	Cu. M.	1364	37.23
1978-79	,,	1243	32.34
1979-80	,,	1046	30.79
1980-81	,,	1010	37.77

Labour and Employers' Organisations

The Trade Union movement in Kerala is over sixty-five years old. The earliest attempt at organising labour in the coir industry commenced in 1920 when the Travancore Labour Association took shape. The Travancore Coir Factory Workers Union was formed in 1921. The movement spread to the farthest areas of productive activity in the State. It has now established its pervasive influence over all facets of social life and has become a major force to be reckoned with.

Kerala remains an industrially backward area. The Trade Union movement here had as elsewhere small beginnings. But despite everything, despite the backwardness, like scattered outposts in a vast agricultural swamp, the movement struck out roots and spread to the farthest areas of productive activity in a relatively short span of time. The inspiration behind the movement was the ideals and activities of our freedom movement. Kerala could not boast of having been the hub of industrial activity in South India. Yet, based on coir, cashew and plantation industries as it was, the movement here could without exaggeration lay claim to the credit of having been the pioneer for the whole of India in several achievements in the field of industrial relations. Ahead of other industrial centres of the country, dearness allowance to cover the rise in the cost of living was demanded and won in the coir industry. The same is true regarding the concept of minimum bonus and bonus as deferred wages which took twenty more years to secure all India acceptance. Then there was the introduction of a system of fall back wages for piece raters in the 1940's which has evolved into 'Minimum Wages' based on work norms and added incentive payments for higher output. The working class had by persistent struggle and by organised strength, achieved for itself the protective provisions, however limited, of several factory and labour laws. An unique feature of the industrial relations machinery is the Industrial Relations Committee (IRC). It would speak of the high level which collective bargaining had attained in Kerala even in the forties. These IRC's imply not only direct industry level bargaining unhampered by the inherent short comings of plant level works committees, but also the status enjoyed by the unions as recognised bargaining agents. This Tripartite Committee consisting of representation of Labour, Management and Government has been a useful forum for settlement of all industry wide issues and has been substantially effective as a guardian of industrial

peace in the industry. The Committee has been successful in settling industry wide issues covering wages, D. A., piece-rate, overtime, gratuity, etc. They have been commended to other States as models to follow. One aspect of the trade union history is the role of the Trade Unions in the struggle for social change.

The growth of trade unions is self evident from the figures given below:

TABLE I

Year	*No. of registered Unions*
1951-52	555
1952-53	568
1953-54	641
1954-55	767
1955-56	791
1956-57	584
1957-58	1,213
1958-59	1,538
1959-60	1,650
1960-61	1,815
1961-62	1,842
1962-63	1,680
1963-64	1,616
1964-65	1,731
1965-66	1,729
1966-67	*2,047*
1967-68	*2,277*
1968-69	2,571
1969-70	2,661
1970-71	2,492
1971-72	2,884
1972-73	3,337
1973-74	3,716
1974-75	4,073
1975-76	4,491
1976-77	5,552
1977-78	5,675
1978-79	6,110
1979-80	6,528
1980-81	6,936
1984-85	8,244

The Employers are organised industry-wise and also region-wise. There are for instance employers' organisation for plantations, cashew, rubber, oil milling etc., in centres where their special interests require protection. Besides there are chambers of commerce or business associations functioning in important cities and trade centres bringing together varied interests among employer's organisations. These associations however form an integral part of the national organisations such as All India Organisation of Industrial Employers, the Employers Federation on India and All India Manufacturers' Organisation. These Organisations are recognized by the Government and participate in the discussions at State level. Their objectives are to promote and protect the interests of employers, to advise members on all problems relating to employer-employee relationship etc.

There are also branches of professional bodies like the National Productivity Council, Institute of Personnel Management, Indian Statistical Unit, Quality Control Wing, Indian Standards Institution.

The present trend clearly reveals that the industrial climate is much better than in other States, as for example, West Bengal, Maharashtra and Tamil Nadu: Number of man days lost due to strikes and lockouts in Kerala in 1983 is only 1,088,969 as against 15,774,697 in Maharashtra 13,177,755 in West Bengal and 1,420,457 in Tamil Nadu as can be seen from Table II.

TABLE II

State-wise details of Strikes and Lockouts and Mandays during 1983

Sl. No.	State/Union Territory	No. of industrial disputes referred to IRM	No. of failure reports received	No. of strikes & lockouts	No. of workers involved	No. of mandays lost
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Centre	7,082	1,955	714	6,35,052	7,538,544
2	Andhra Pradesh	N.A.	N.A.	23	5,062	75,826
3	Assam	299	64	3	2,794	6,319
4	Bihar	N.A.	N.A.	74	21,912	421,807
5	Gujarat	N.A.	N.A.	127	23,048	516,232
6	Haryana	3,876	2,204	25	10,112	547,658
7	Karnataka	2,498	678	26	10,881	270,612
8	Kerala	N.A.	N.A.	34	16,729	1,088,963
9	Madhya Pradesh	552	492	28	5,682	66,695
10	Maharashtra	7,741	2,545	156	219,926	15,774,697
11	Manipur	7	2	4	674	94,045

(1)	(2)	(3)	(4)	(5)	(6)	(7)
12	Orissa	725	275	7	2,542	11,472
13	Punjab	N.A	N.A.	35	8,795	97,891
14	Rajasthan	1,768	988	39	10,981	3,76,127
15	Tamil Nadu	7,740	1,857	176	51,921	1,420,457
16	Uttar Pradesh	N.A.	N.A.	99	40,257	429,931
17	West Bengal	N A.	N.A.	136	112,449	13,177,755
18	Andaman & Nicobar	N.A.	N.A.	3	1,066	1,938
19	Chandigarh	335	149	N.A.	N.A.	N A
20	Delhi	6,351	2,219	15	7,878	265,363
21	Goa, Daman & Diu	N.A.	N.A.	12	579	53,916
22	Pondicherry	81	36	10	2,365	2,723
	Total	39,075	13,464	1,746	1,190,705	37,145,977

N A.—Not available

Source:—Labour Ministry Report 1983-94

Welfare of Industrial Labour:

Kerala State has made an unique experiment in dispute settlement. Formation of Industrial Relation Committee for traditional industries has helped to solve industry-wise disputes. Similarly the Voluntary Arbitration Board was constituted to help the dispute settlement through voluntary negotiation. Kerala is the only State which passed a special enactment for agricultural labour for their dispute settlement and welfare. Kerala has also the distinction of fixing and revising the minimum wages for all industries mentioned in the Schedule given as Table III to the Minimum Wages Act and truthfully implementing it. But this enthusiasm has recoiled on it in the form of migration of capital.

TABLE III

Employment for which minimum wages are fixed in Kerala

1. Rice mill, flour mill or dal mill
2. Tobacco (including beedi making)
3. Plantation
4. Oil mill
5. Local authority
6. Constructions and maintenance of roads or in building operations
7. Stone breaking
8. Public motor transport
9. Tanneries and leather manufacturing
10. Coir industry
11. Cashew industry
12. Printing presses
13. Tile manufacturing
14. Toddy tapping
15. Match industry
16. Agriculture operation

17. Shops and establishments including hotels and restaurants
18. Timber industry
19. Bricks manufacturing
20. Handloom
21. Plywood
22. Minor ports
23. Works in forest
24. Rubber products
25. Minor engineering
26. Fish peeling, fish canning and freezing and exporting of sea-food and frog-legs
27. Hill produce
28. Ayurvedic and allopathic medicines
29. Powerlooms
30. Manufacture and sale of umbrella
31. Rubber crepe mills
32. Climbing of arecanut trees and in dairy farms
33. Construction and maintenance of dams (hydro-electric projects)
34. Private hospitals (not a separate scheduled employment)

Kerala goes on its own path with regard to payment of bonus law. The guidelines issued provide for payment for minimum bonus of 8⅓% in regard to all firms irrespective whether they make profits or not. It also stipulates that every firm would have to pay same bonus as paid in the previous year.

The Government has laid down (in July 1984) guidelines to provide for payment of minimum bonus of 8⅓% by public sector undertakings and Co-operative institutions, irrespective of profits or loss. Bonus as paid in the previous year would have to be paid in the current year. Where the amount payable under the guidelines exceeds the bonus payable as per the provisions of the payment of the Bonus Act, the said excess

shall be treated as ex-gratia in all cases. In no case payment including 'ex-gratia' 'goodwill' or any other payment shall exceed 20%. No deviation from these guidelines shall be made under any other circumstances.

A distinctive feature affecting labour relations in Kerala is the pressure mounted by several interest groups at the constructional stage making preposterous demands such as the pre-emptive right for loading and unloading factory materials arriving by road transport even where the companies had their own permanent employees or contract arrangement for performing these jobs. But this short coming is likely to be overcome with the implementation of the Kerala Head Load Workers Act, which provides for the smoother labour relations in the loading and unloading of material.

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CHAPTER VI

BANKING, TRADE AND COMMERCE

A. Banking and Finance:

(a) History of indigenous banking

History of indigenous banking.—The earliest medium of credit was the indigenous banker. There are two classes of indigenous bankers viz., the *hundi* merchants who lend money and receive deposits and the money lenders who do not usually take in deposits. The origin of the *hundi* business may be traced to the beginning of the nineteenth century. The bulk of this business is run as family concerns, the eldest male members being in 'management'. The *hundi* merchants financed the internal trade. They received deposits on a system called "pattuvaravu" or current accounts. The interest was calculated on the daily balance. No distinction was made between current accounts and fixed deposits. They issued letters of credit or *'melezhuthu'* and dealt in *hundi* which may be described as an inland bill of exchange or sight draft—Depositors were given a pass book in which receipts and withdrawals were noted. They followed a system of chits instead of cheques. They advanced loans on pro-notes on single or joint signatures. The system suffered a set-back with the advent of Joint Stock Banks. Mismanagement, fraud, inadequacy of finance and delays were also factors which contributed to its failure. Nevertheless, the money lenders, continued to exercise great influence in financing agriculture. There were numerous small money lenders in both rural and urban areas. Their transactions were generally with small cultivators and traders. They levied higher rates of interest, but seldom financed trade. They lent only on valuable security.

In spite of the decline in their number in recent years, the money lenders still play a role in financing the agriculturists, especially those in the lower strata with advances in cash and grain. The rate of interest they charge ranges from 6 to 12% on money loans and 10 to 20% on paddy loans. The bulk of the loans is unsecured and is generally given for a short duration, say one year. There are also the small money lenders who deal with small capital. Their transactions are generally with small cultivators and traders and they levy

much higher interest rates. The number of these money lenders cannot be easily ascertained.

In most cases, the terms of lending adversely affect the poor cultivator. In urban areas, when advancing loans to businessmen like contractors, the money lenders charge some commission besides realising the usual interest, which is often deducted from the principal. No sharp dividing line can be drawn between the urban and rural money lender in the State. A cardinal feature is that there is no special class of traditional and hereditary money lenders like the Nattukottai Chetties, Marvaries, Mahajans or Pathans. The money lender in the rural areas is invariably an agriculturist himself. However, there were originally some families, who came from Kalladakurichi in Tirunelveli District of Madras State. They are now confined to agricultural areas like Kuttanad in Alleppey District. With the wide-spread development of banking habits, the number of money lenders operating is dwindling.

In this connection, it would be interesting to note that as far back as 1835, the Travancore State had two laws called Regulations I and IV of 1010 Kollam Era (1835 A. D.) restricting the rate and amount of interest, which could be decreed or realised through courts of law.

In the erstwhile Cochin State, no Money-lender's Act had been enacted. The Cochin Kuries Act VII of 1107 (1931-32) and the Cochin Starting of Kuries Restriction Act XII of 1120 (1944-45) provided for some amount of control, but the fundamental defect of exploiting the creditor was not cured. Another legislation which aimed at preventing unfair transactions and charging of excessive rate of interest was the Cochin Usurious Loans Regulation of June, 1936. Under this Regulation interest above 12% was defined to be excessive.

In the Malabar region the Madras Agriculturist Relief Act (1938) stipulated a ceiling of 5½%. The most recent item of legislation in the sphere of money lending is the Kerala Money Lender's Act 1958, whose object is to provide for the regulation and control of the business of money lenders in Kerala State. Under the Act, no person can carry on business as a money lender without a license under the Act. Besides, a money lender advancing a smaller amount or securing higher interest than that specified in the accounts is liable to punishment under the Act.

The provisions of the Act are as follows:—

Whoever carried on the business of money, lending without a licence or in violation of the conditions of the licence or otherwise than in confirmity with the terms and conditions of the licence shall be punished without imprisonment for a term which in the absence of special reasons to be recorded in the judgement of the court, shall not be less than three months but which may extend to three years and with fine which may extend to fifty thousand rupees. No money lender shall charge interest on any loan at a rate exceeding two percent above the maximum rate of interest charged by commercial banks on loans granted by them.

The accounts of every money lender shall be audited at least once in every year by a person who is a chartered accountant within the meaning of the Chartered Accountants Act 1949 and the audit report shall be submitted to such officer or authority and before such date as may be specified by the Government in this behalf. If the audit report discloses any irregularity or any contravention or non compliance of the provisions of this Act or the rules made thereunder or of any of the conditions of the licence, the officer or authority to whom such audit report is submitted may, without prejudice to any other action that may be taken under any other provision of this Act, by order in writing direct the money lender to take such action as may be specified in the order within the time mentioned therein to remedy the irregularity or to take such steps necessary to comply with the provisions of this Act or the rules made thereunder or of the conditions of the licence.

The 1958 Act was amended in 1963 and 1983 *. By the end of 1983, 5,409 private financiers had been licensed. Trichur District, an area from where there has been considerable migration to West Asia, has very nearly half of all private financiers (2,682). Ernakulam District has 928, Quilon (including Pathanamthitta) 409, Alleppey 313, Kottayam 298, Trivandrum 256, Kozhikode (including Wynad) 216, Palghat

* In the most recent amendment, the licence fee has been enhanced from Rs. 100 to Rs. 1,000; provision has been incorporated for security deposits ranging from Rs. 5,000 to Rs. 50,000 depending on the extent of transactions, ceiling on interest charged on borrowers has been fixed.

142, Idukki 85 and Cannanore 50. The lacunae in the law combined with "lapses in its implementation" had prevented provisions in the Act from effectively restraining either the unlicensed private financiers or the more shady activities of the authorised ones. The implementation of the Act was left to the Agricultural Income tax and Sales tax Department.

The Act covered only loans but could not be used to control the collection of deposits. Some authorised financiers and the respectability their licences gave them—and sometimes even claimed to be bankers covered by Banking Companies Act, to collect deposits. With advertisements in the mass media, they attracted depositors, by promising high interest schemes This affects deposits in the nationalised, scheduled and co-operative Banks. The financiers enticed depositors with interest upto 36% and then collected loans with an interest of 60% or more thus gaining enormous profit.

A major reason why people were willing to accept loans at these exorbitant rates of interest was the simplicity of procedures that these financiers adopted. Around 96% of the loans given by private financiers were without security. People in the interior areas where there was an insufficient spread of bank branches, were driven to the financiers out of sheer necessity. To counter act this, the nationalised, scheduled and Co-operative Banks should simplify their cumbersome loan procedures.

The District-wise break up (provisional) of private finance companies on 1st October 1986 was as follows:—

Trichur	4,200
Kozhikode	1,109
Alleppey	760
Ernakulam	2,812
Kottayam	813
Trivandrum	603
Quilon	410
Palghat	220
Idukki	200
Malappuram	82
Kasaragode & Cannanore	52
	11,261

Another indigenous credit institution prevalent is the *kuri* or *chitti*. It is perhaps the most popular institution in this part providing credit facilities for a variety of activities such as agriculture, marketing, small scale industries, etc. It is also popular as an institution for investment of savings especially for mobilising fluid capital. The antiquity of the institution is testified to by Logan in his *'Manual of the Malabar District'* and by Sim Cox in his *'Primitive Civilisations'*. In early days, when the idea of modern banking transactions had not permeated into the minds of the people, the chit funds formed an important source of credit and investment facilities. A quantitative study of the volume of money transactions through the *Chitties* does not appear to have been made in a systematic manner in early times. Logan observes in his Manual "Another curious custom has come down from ancient times and is still flourishing though the mutual confidence on which it relies for its proper effects shows signs of breaking down and is cited as a degeneracy of Malayali manners. Any one desirous of raising a considerable sum of money for some temporary purpose invites his friends to join him in what is called a *kuri* or lottery: chance enters very little, however, into the arrangement, and it would be a better term to call the members a mutual loan society. The organiser of the *kuri* gets a certain number of his friends to subscribe a certain amount of money, or of rice husked or unhusked, as the case may be. The friends bring their contributions to his house, where they are hospitably entertained and by lot the person is selected to whom similar contributions from all present, including the organizer of the *kuri*, are to be made at a certain date then and there fixed. This individual in turn hospitably entertains his friends when they come with their contributions. A third person is then selected, and the same thing comes of at his house. And so it goes on, until every one of the original members or his heir has in turn reaped the benefits of the contributions of his friends. The arrangement is of obvious benefit in several ways to those concerned". [1]

The principle, however, is the same for all. It is that members of a group contribute towards a common fund, which is given to one member after another. The advantages are two-fold. First, a man can save through subscribing small

[1] Malabar Manual, Vol. I, Logan p. 173.

amounts over a period of time, and, second, he will receive his savings in a lump sum, which will enable him to use them to greater effect than if the same amount were spent in small expenses over a period of time. *Kuri* savings are specially used for wedding ceremonies and at other times when capital outlay is needed. These kinds of *Kuris* are most common in the villages; they are informal as to the amount given and the interest received. They are a rough-and-ready way of self-help, and bind people to each other with a tie of self-interest.[*]

The ubiquitous chit funds constitute the core of the well grooved net work of private money lending establishments. The chit funds are the most popular financial schemes to which as much as 21.5% of the total households in the State subscribe.

The chit fund has been a unique system representing essentially an inter-household transaction in the rural areas and 19.5% of the household savings is represented by chit funds while bank deposits account for only 19.4%. To a great extent the commercial undertakings are also dependent on the finances generated by the chit funds. But the vigorous enforcement of the laws including the Central Act, tightened the controls over the chit funds and reduced not only the margin of profits for the investors but also the timely availability of finance to the needy. The controls were necessitated by the mushrooming of a number of firms, which resorted to unscrupulous practices resulting in a series of closures and consequent losses to the subscribers. To overcome this hardship, the Government of Kerala, set up in November 1969, its own organization to conduct chitties in an orderly manner known as the Kerala State Financial Enterprises Ltd., with its registered office at Trichur the firm is conducting chitties through a wide net work of branches disbursed all over the State. The chitties conducted by this organization are in popular esteem. The authorised capital of the company is Rs. 50 lakhs divided into equity shares of Rs. 100 each. The paid up capital of the company as on 31-3-1985 amounted to Rs. 28 lakhs contributed by the Government of Kerala. In 1982-83, the firm realized a net profit of Rs. 29.39 lakhs from its operations. Originally started as a chitty conducting institution, the company has now diversified its activities to hire purchase business. Besides the company is working as an operating agent of the social security scheme of the Government of Kerala.

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[*] Quoted in All India Rural Credit Survey, Vol. II, 1954 pp. 64-65.

The functioning of the chitties is regulated by the Registration Department which administers: (i) The Travancore Chitties Act, 1120 Act XXVI of 1120) and the Travancore Chitties Rules (ii) The Cochin Kuries Regulation (Regulation VII of 1107) and the Cochin Kuries Rules, (iii) The Cochin Starting of Kuries Restriction Act (Act XII of 1120), (iv) The Kerala Chitties Act, 1957 (Act 23 of 1973) as amended by the Kerala Chitties (Amendment) Act, 1978 (Act 19 of 1978) and the Kerala Chitties Rules, 1975.

In each District there are Chitty Inspectors and Chitty Auditors to audit the accounts of the chitties and process applications for starting of chitties after scrutiny of the financial background of the applicants.

There were 10,847 functioning chitties/kuries at the end of 1984-85, with a capital of about Rs. 16.37 crores

The private financing companies sprang up as a natural adjunct or extension of the chit fund companies to fill a vaccum. The boom was encouraged by Gulf remittances. The neo affluent were reluctant to invest their hard earned money in industrial ventures because of the immense risk involved in the peculiar circumstances of Kerala and they found an easy way to multiply their remittances through the financing bodies.

The very dimensions of the operations of private financiers outside the co-operative and commercial bank credit structure and their ingenious methods have put them beyond the long arm of law. A count of their number cannot be made with any degree of authenticity. Unofficial estimates put them at over 16,000 in the State with estimates of deposits with them ranging between Rs. 500 & Rs. 1,000 crores. Official estimates put the annual turnover of these companies at Rs. 1,000 crores with deposits between Rs. 350 and 500 crores.

Trichur has been the cradle of the new phenomenon of the banking companies The majority of the money lenders of the state are in Trichur District, the town and its suburbs alone accounting for not less than 3,000 They have their own rules While large companies offer fabulously high interest rates for deposits ranging from 30 to 40% and also attract depositors through well paid for advertisements in newspapers and periodicals (which incidentally) have become a major source of revenue for the fourth estate), the Trichur firms generally operate at a comparatively subdued level. The average interest paid to depositors in Trichur is 24% while the interest on the loans range from 36 to 72%, depending on the nature of the loans. Deposits are also collected as subscriptions on daily, weekly or monthly basis. The borrowers include small traders

who pay interest at the rate of 5% every day or big time merchants and speculators who pay a share of the profits as commission for short term loans. A large number of financing companies have turned to real estates, buying and selling small pieces of land in towns and cities and constructing high commercial structures of vehicles and consumer durables and even film making are financed by some of the finance companies.

The main attraction for the depositor is of course the high rate of interest which is invariably more than double the rate given by commercial banks for long term depositors. For the borrowers the ready availability of money is by itself a refreshing contrast with the cumbersome procedures and collateral securities involved in bank loans. Moreover bank loans are not available for certain types of commercial activities.

Inadequacies of the credit policies of the Government led to the proliferation of the private financing bodies. The private financing boom was noticed during 1980-83 when the Reserve Bank credit squeeze became increasingly severe. The credit gap in the State estimated at around 55% is the basic reason for the growth of private lender. When the RBI stipulation on the liquidity ratio of the commercial banks were tightened the commercial community had to seek credit elsewhere. The 2721 bank branches in the State command a total deposit of Rs. 3,600 crores accounting for nearly 60% of the State's income. The Co-operative Banks have another Rs. 390 crores. But the credit deposit ratio of these banks is still very low when compared to the 91% in Tamil Nadu or 104% in Delhi. The Commercial Banks and the Co-operative Banks together have lent nearly Rs. 1,100 crores.

The claims issued by companies on themselves in the form of deposits constitute an important source of finance for the corporate sector. Despite some stringent restrictions in this regard, the funds mobilised by manufacturing, trading and financial companies from the capital market through acceptance of deposits has risen substantially over the years. A study published in the Reserve Bank of India Bulletin of November 1983, presents useful information on growth of non-banking company deposits.

The amount of deposits mobilised by financial and non-financial companies rose sharply by seven and half times or Rs. 4,743 crores between March 1973 and March 1982. About 91% of the deposits were mobilised by public limited companies and manufacturing and trading companies accounted for 68% of the deposits outstanding at the end of March 1982.

Total deposits outstanding with non-banking companies at the end of March 1982 were Rs. 5,492 crores which 42% were held by Government Companies. At the end of March 1981, the share of Government Companies had been only 35%. The share of Government non-financial companies in total deposits of non-banking companies at the end of March 1982 was however smaller at 25%.

Development in the non-banking financial intermediary sector seem to be inversely related to those in the organised banking sector. 1982 had been an unusual year for the banking industry both in the matter of credit expansion and mobilisation of deposits. For instance, growth of deposits of commercial banks at 15.4% in 1981-82 had been the lowest in the decade ending 1982, whereas the amount of deposits raised by non-banking companies shot up by a record amount of Rs. 1,300 crore or 31% in the year as compared with 21% in 1980-81. The proportion of deposits with non-banking companies to those of scheduled banks which had been persistently rising since the early seventies, with the exception of 1976-78 stood at 12.5% as at the end of 1982 against 11% in 1981.

The bulk (about 40%) of the deposits with non-banking companies was in the form of "exempted borrowings and receipts not counting as deposits" - such as money received from share holders or private limited companies, from purchasing and selling agents and joint stock companies and "other exempted borrowings and receipts not counting as deposits". Significantly the last mentioned item accounted for 38% of total deposits or 52% of exempted borrowings of non-banking companies in 1982 The companies seemed to have taken recourse to this mode in order to get round the ceiling on acceptance of deposits.

Another noteworthy aspect of financial intermediation by non-banking companies is that 96% of deposits aggregated Rs. 25 lakhs and over and was held by 25% of the total companies reporting acceptance of deposits. This lends credence to the view that large and established companies are able to by pass the stringency of credit policy measures and that the burdent of these measures is really borne by medium and small companies.

The 1972 Banking Commission's Study group on non-banking financial intermediaries noted that they had come to occupy a significant place in the financial structure and with their expanding operations, the question of safeguarding depositors interests had assumed greater significance. Several measures were recommended by the commission to regulate their functioning, including the

tightening of the state legislation on money lending and extension of R. B. I. controls to them, on the same lines as in the case of commercial banks.

(b) General credit facilities available

The General Credit facilities available may be classified for convenience into the following categories viz., Government, Co-operatives, money lenders, traders and commission agents, commercial banks, and others including relatives, wealthy agriculturists etc.

(1) *Indebtedness:*

Indebtedness particularly among the weaker sections of the population, has been an age old problem in India Institutionalised lendings to the rural sector have been far too inadequate to cope with the increasing demands for rural credit. Rural indebtedness, comprises of all types of loans (cash and kind) short, medium and long term of the household. Such loans would include all those availed of for enterprise as well as for domestic purpose. Besides other loans for purchase of raw-materials etc., they would also include 'trade credit' ie. credit given by a trader in anticipation of sale of crops to him, 'credit purchase' made for enterprise, fees owned for professional services such as those of doctors, lawyers etc and 'hand loans' ie. interest free loans taken from neighbours and friends for brief duration. Supply of credit has not been in keeping with the relative requirements of different regions. Private sources of credit still cater to the requirements of a sizeable number of rural households, the majority of whom belong to the category of small and marginal farmers as well as landless labourer and artisans. Being at the mercy of private money lenders, these classes of borrowers have been put to serious hardships as the practice of charging usurious rates of interest and other malpractices are a universal feature of professional money lending. Past surveys of rural debt carried out by the Reserve Bank of India have shown, in the early sixties that 15 per cent of the credit requirements of the rural sector could be met by Government and institutional agencies. The Reserve Bank's Survey of 1971 has revealed that, inspite of considerable expansion of institutional credit during the preceding decade, only one third of the credit requirements of the rural sector was met by institutional agencies, the remaining being met by the private money lending class comprising of affluent agriculturists and landlords, traders and professional money lenders.

The 1962 survey of rural debt conducted by the Reserve Bank of India showed that the outstanding cash indebtedness of the rural households amounted to Rs. 2,789 crores. The corresponding figure

for Kerala was estimated at Rs. 62 crores. The comparative source-wise financing picture was as follows:—

Cash Indebtedness according to credit agency (as on 30th June 1962)

(Rs. in crores)

	Credit Agency	*All India*	*Kerala*
1.	Government	146.9(5.3)	2.8(4 5)
2.	Co-operatives	254.(9.1)	5.7(9.1)
3.	Commercial Banks	11.8(0.4)	2.5(4.0)
4.	Non-institutional agencies	2,375.4(85.2)	51.4(82.4)
	Total	2,788.9(100.0)	62.4(100.0)

(Figures in brackets represent percentage to total)

It will be seen from the above that according to the position that obtained in 1962, among the institutional agencies, the co-operatives provided the maximum credit (9 1 per cent for all India and Kerala). In respect of bank finance, while the all India ratio was practically negligible—the outstanding credit being only 0 4 per cent—the percentage for Kerala was much better, being 4 per cent However, on the whole it may be stated that bulk of the credit requirements both at the all India level as well as at the State level was met through non-institutional borrowings. Institutional lendings constituted only a small fraction of the total credit availed of by the rural households.

The Reserve Bank's subsequent survey conducted in 1971 has revealed that the outstanding indebtedness of the rural households registered an increase of 40 per cent in the aggregate as compared with the position a decade ago. As against the estimated indebtedness of Rs. 2,789 crores in 1962, the corresponding figure for 1971 worked out to Rs. 3,920 crores on the basis of the data relating to the average debt for rural household and the total number of rural household as indicated in the first volume on Rural Debt published by the Reserve Bank in June 1975.

Data pertaining to Kerala as published in the above document shows that the average outstanding rural indebtedness in the State in 1971 amounted to Rs. 369 per household. If this is related to the total number of rural households in the State as indicated in the

Reserve Bank's study, the aggregate amount of outstanding rural indebtedness would fall within a range of Rs. 95 to Rs. 100 crores. It is also seen that the northern region comprising of the districts of Cannanore, Kozhikode, Malappuram and Palghat accounted for about one-third of this total estimated rural debt.

However, some preliminary studies made by the Reserve Bank have shown that as compared with the position in 1962, institutional lendings have registered some improvement. At the All India level, as against the ratio of 15 per cent in 1962, the latest ratio has been found to be roughly one-third. This would mean that despite the significant increases in the number of banking and other credit agencies during the last decade, as much as two-third of credit requirements of the rural households is still being met by non-institutional agencies such as affluent cultivators, traders and professional money lenders.

The outstanding credit provided by the Primary Co-operative Societies in 1971 amounted to Rs. 36 crores. Another Rs. 7 crores represented the outstandings in respect of the land mortgage banks Direct agricultural credit provided by the commercial banks accounted for another Rs. 13 crores. Outstanding taccavi loans given by the State Government amounted to about Rs. 3 crores If these figures are added up, total institutional lendings to the rural sector would amount to Rs 59 crores. On the assumption that these loans were all availed of by the rural households, their proportion in relation to the aggregate amount of rural indebtedness, would work out to 60 per cent. As compared with the position in 1962, this represents a significant improvement. The main factor accounting for this improvement in institutional lending is the substantial expansion of co-operative credit. As against 9.1 per cent in 1962, co-operative credit constituted about 43 per cent of the aggregate outstanding borrowings of the rural households in 1971.

The State Planning Board's survey had established that in 1977 78 52% of the households in the State were in debt. In rural areas 53% of the households were indebted, while in urban areas the corresponding figure was 46%. The total indebtedness was around Rs 250 crores with 80 per cent of this accounted by the rural sector alone. The average debt per indebted household was around Rs. 1,133.

By 1982* the percentage of indebted households in the State as a whole had come down to 47, but the total indebtedness had sky-rocketed to Rs 1,745 crores (Rs. 1,416 crores as principal and

*In 1982, the 37th round of the National Sample Survey on debt and investment was conducted.

Rs. 329 crores as interest). The average debt per indebted household had correspondingly shot up to Rs. 8,507 (outstanding principal accounting for Rs. 6,903 and interest for Rs. 1,604).

From the figures provided by the report in indebtedness and private money lending in Kerala prepared by the Directorate of Economics and Statistics at the instance of the Estimates Committee of the Kerala Legislature, money lenders emerge as essentially small scale operators in 1982, the average amount they gave was just Rs. 2,153 per loan, compared with Rs. 3,065 from Co-operatives and Rs. 18,888 from Commercial Banks.

During 1977-78, no less than a quarter Rs. 63.74 crores of the total loans distributed in the State (altogether Rs. 249.78 crores) were given by these private financiers. In contrast, the co-operatives accounted for 20.79% (Rs. 51.93 crores) and the commercial banks for 16.57 (Rs. 41.39 crores).

Well over 60% of the money lenders loans (by amount) were for capital and current expenditure in "non-farm business" capital and current expenditure on farm business accounted for around 10%.

Nearly 65% of the amounts loaned by private financiers were without any written document. Where documents existed, generally the amount shown was five per cent higher than the credit actually extended. Only for household expenditure and money borrowed for ceremonies, was the amount shown less in the documents. The greatest increase by 17% was in the case of business capital expenditure.

A lower rate of interest than was actually paid to the private financiers was usually recorded in the documents. About 90% of the loans (by amount) was issued at more than 23% interest per annum, and two-thirds at more than 36%. This stands out in stark contrast to the National Sample Survey which showed that in 1982 only about four per cent of the loans (by amount) carried on interest in excess of 23% per annum.

The Directorate's survey found that about 46% of the loans (by amount) were to be repaid as lump sum and only the remaining 54% was allowed in instalment paying facilities.

About 38% of the total loans issued was by unregistered persons or institutions. Nearly 80% of the loans (by amount) was issued by private financiers on the basis of personal security or surety of other persons. Gold and other valuables accounted for just over 12%, crops for 0.1% and land for 2.38%.

For about two-thirds of the total sum advanced, the period of repayment was less than one year. Since 96% of the loans from private financiers was issued without surety, and readily, this could have been a major stimulus for borrowing from these private financiers.

Prevalence of usury

Many of the State-wide practices are variants of a few traditional systems. To facilitate analysis, therefore, the subject matter could be discussed in terms of categories of borrowers and types of lending agencies. Borrowers may be classified as: (i) small and marginal farmers; (ii) landless agricultural labourers; (iii) plantation labourers; (iv) rural artisans; (v) small traders; (vi) tribals and (vii) fishermen while sources of lending agencies have been categorised as Government, commercial banks, co-operative societies, professional money lenders, traders, affluent farmers, relatives etc.

The credit requirements of the small and marginal farmers are met by Service Co-operative Banks, Commercial Banks, indigenous banks, N.E.S. Blocks and other Government Departments. This category of borrowers depends to a great extent on the service co-operative banks. It is difficult to draw the line between the portion of the loan utilised for production and for consumption. To supplement the credit gap, this group of people resort to indigenous money lender|banker.

Though a large part of the agricultural credit needs is met by the co-operative sector, the nationalised banks and Government agencies, the small farmers resort to borrowings from money lenders, traders and big landlords. There are a few licensed pawn-brokers in the village and a much larger number of unlicensed money lenders drawn from various occupational classes and economic strata. The lending practices of this latter category and the rates of interest charged by them vary considerably. Both these categories of lenders advance money for production as well as consumption purposes, but mainly for the latter's needs such as education of children, marriages and festivals and contingencies such as illness and funeral. The period of loan is often short. The securities generally offered for loans are: (i) land, crop and other property; (ii) promissory note (iii) Gold ornaments. The major characteristics of these loans are described in the following tabular statement.

Rural Debt—Type and Nature of Common Practices

Type of loan/ local name	*Interest rate (range)*	*Modus operandi*	*Borrower*	*Lender*	*Remarks*
(1)	(2)	(3)	(4)	(5)	(6)
I. Mortgage of land:					
(a) Otti (b) Nadappu panayam (c) Choondu panayam (d) Verum panayam	36 to 60%	In these transactions the lender advances money (i) by taking actual possession of the land and (ii) without taking possession of land. In the former case the yield from the property is adjusted only towards interest. In the latter case the interest is to be paid in cash or kind. In both the cases the borrower will have to repay the principal when he wants to redeem the property. The common practice is to make a registered document wherein a much higher amount is shown as the debt with a rate of interest admissible in the Munsiff Court. But the rate of interest actually charged will vary from 36% to 60%.	Small and marginal farmers and middle class people	Money lenders, affluent farmers and traders	After the legislation of Land Reforms Act this practice is one the decline.
(e) Viswasa theeru	36 to 90%	In this type of practice the money lender insists on a registered sale deed in his favour at the expense of the borrower before lending money. If the loan is paid back during the prescribed period with the high rate of interest, the sale deed will be returned to the borrower Here the actual possession of the land will be with the borrower	Small and marginal farmers and middle class people	Money lenders, affluent farmers and traders	After the legislation of land Reforms Act this practice is on the decline.

(1)	(2)	(3)	(4)	(5)	(6)
II. Loans, advanced against crops:					
(i) (a) Melpattom (b) Undaruthi		The principal and interest are redeemed by taking the usufructs of the perennial crops When the Undaruthy or Melpattom is for a short period (usually, for one year) the borrower will get only 35 to 40% of the market value of the produce When the agreements are for longer periods (usually for five years) the borrower will get only 25 to 30% of the market value of the produce.	Small and marginal farmers and middle class people	Money lenders, affluent farmers and traders	After the legislation of Land Reforms Act this practice is on the decline
(c) Choondi-panayam	36-200%	In Choondipanayam the yield from the property is adjusted only towards interest. In this practice no specific period is prescribed and the lender enjoys the income from the property till he gets back the principal.	do.	do.	do.
(ii) Thengu Otti	36-200%	A specified number of coconut trees is earmarked for the lender who will enjoy the yield from the trees as interest for the amount advanced The principal will have to be repaid in lump to redeem the trees.	Small and marginal farmers and small traders etc.	Traders, affluent neighbours, money lenders	This practice is different from Kettu-Thengu system where almost the market rates are given.
(iii) Forward trading in standing crops	90-240%	Generally the transactions are carried out 3 to 6 months in advance of the harvest of the produce. The borrower gets only 40 to 60% of the market value of the produce. The responsibility of harvesting rests with the lender. This type of transaction is found generally in the case of arecanut, pepper, banana, plantain, mango	Small and marginal farmers agricultural labourers Adivasis	Traders	

		etc. In the case of crops grown by 'Adivasis' also this type of practice is prevalent, for example in Attapadi area, money is advanced against millet, arhur, ragi etc.			
(iv) Vila murichu kodukkal	300-400%	The price of the produce is cut and fixed muc' below the market rate unilaterally by the money lender himself. The producer gets only 30 to 40% of the value of his produce. Here the responsibility of harvesting and supplying the produce to the lender rests with the borrower.	Small and marginal farmers	Traders	
III. Loans on Security of cattle:					
(i) Alacheettu	36-60%	This is a system where money is advanced against the security of cattle. A sale deed is executed in favour of the money lender eventhough the animals are not transferred to the lender. But another agreement to the effect that the animals are entrusted with the borrower for rearing purpose is also made. Repayment of loan is in cash.	Small and marginal farmers and others	Professional money lenders, affluent farmers, rich neighbours etc.	Prevalent in Wynad area.
(ii) Loans for purchase of bullocks					
IV. Gold loan	24-72%	Gold ornaments are pledged usually for a period of 3 months to one year. Repledging of these ornaments by the lender in commercial banks with a view to raise capital at a lower rate of interest is also prevalent:	Small and marginal farmers, artisans, small traders agricultural labourers	Professional money lenders, private bankers and affluent people in the rural areas	On the expiry of the period of loan, the ornaments pledged are appropriated by the lenders.
V. Pledging of tools, implements and household utensils	24-60%	Money is advanced on the security of tools, agricultural implements and household utensils:	Marginal farmers artisans and agricultural labourers	do.	

	(1)	(2)	(3)	(4)	(5)	(6)
VI.	Pledging of ration card	50-200%	Money is advanced on the security of ration cards. Broadly there are two methods by which money is advanced. The 1st type is of a short-term nature and involves only small amounts. The lender purchases the ration articles. After the expiry of the specified period the ration cards will be returned and no repayment is necessary. In the second type a higher amount is borrowed and no time limit is fixed for repayment. In lieu of interest the lender is allowed to use the ration cards. When the principal is repaid the ration card will be returned.	Agricultural labourers and artisans	Affluent neighbours and petty traders	No amount is paid by way of interest by the borrower. But the lender is able to get a very good margin of profit by the resale of ration items at the open market prices.
VII.	Pledging of fishing equip-ments	5-10% (per fishing day)	Fishermen labourers who own traditional crafts and gears get credit by pledging their equipments. The amount involved ranges from Rs. 500 to Rs. 3,000. The auctioning right of the daily catch rests with the lender and interest for the amount advanced is deducted from the sale proceeds. The principal will have to be paid back in lump sum after the prescribed period. This type of loans is also advanced on the basis of mutual trust without written agreements.	Master fishermen who owns the equipments	Private money lender, affluent people in the community etc.	Generally, the borrowed money is used to advance wages to other workers and also for purposes of festivals, ceremonies etc. Breach of contract and litigation are not common. There payment of the principal is not insisted with the result that indebtedness continues for long

VIII.	Cash loans taken by fishermen workers		Fishermen workers take advances of Rs. 400 to 500 from his Master Fishermen/ craft owner. The condition is that the fisher men worker will have to work under the Master fishermen until the loans are cleared. Usually the loans are not cleared and they continue to work under him for one to three years. The owner retains ½ of the daily catch as interest and the rest shared by the workers.	Fishermen labourers.	Master Fishermen craft owners.	By this arrangement Master fishermen and craft owners retain the services of expert crew for a long period, Cases of litigation are rare.
IX.	Cash loans by head load fish hawkers	5–10% per day	Mostly women are engaged in this business. They carry out the business on borrowed money. Loans are mostly on daily basis. The principal along with interest will have to be paid back daily. The transaction is taking place on mutual trust.	Fish hawkers	Small Traders and others.	
X.	Promissory Note	36–60%	Loans are advanced to credit-worthy persons after getting a promissory note executed. The borrower promises to pay back the principal with legally admissible interest within a specified period. A higher amount, generally two to three times the actual amount lent is shown as principal.	Small and marginal farmers, middl class people, small traders, etc.	Money lenders, affluent farmers, business-men and persons belonging to fixed income group	
		40–80%	Another variation of this type of practice is that the interest is acceptable in kind, mainly paddy in some areas.	do.	do.	
XI.	Cash loans: (i) Cash loans.	120–180%	Generally the practice is to give Rs. 10 to Rs. 15 every month as interest for every Rs. 100 advanced. In most cases the money lender deducts the interest first and gives only Rs. 85 or Rs. 90 as the case may be. The repayment can be either in lumb sum or in weekly instalments are agreed upon.	Small farmers, artisans, person belonging to fixed income groups small traders	Professional money lenders	The practice of repaying by weekly instalments is known as 'kists' in Malappuram and Palghat districts.

(1)	(2)	(3)	(4)	(5)	(6)
(ii) Cash loans around market centres	10–20% per day.	The usual practice is that for every Rs. 100 taken as loan in the morning Rs. 110 to Rs. 120 will have to returned in the evening.	Small traders	Professional money lenders	
(iii) Roll		In this type of loan, usually a sum of Rs. 80 will be paid in advance on condition that it should be repaid at the rate of Re. 1 per day for 100 consecutive days.	Small traders	Professional money lenders	
(iv) Kanthuvatti		The practice is to advance Rs. 7.50 on condition that Rs. 10 will be paid back after a week. Though the amount is advanced without any security, the personal surety of a third person is necessary.	Petty traders Adivasis	Money lenders	Prevalent among tribals in Attapadi area of Palghat district.
XII. Unregistered chitty:					
(i) Chitty		If the chitty or kuri is bid during the early period, the subscriber loses heavily and will have to repay two to three times the amount he actually receives.	Small traders, artisans, agricultural labourers	Professional money lenders, Private bankers	
(ii) Daily Chitty		In this type of chitty, the sale will be generally small amount like Rs. 99, Rs. 100 etc., and the subscriber is free to bid the chitty even at 50% of the amount of sale	do.	do.	

XIII.	Loans in kind:- Pothi	100–120%	Lending and repayment are in kind usually the transactions are in paddy. For one measure of paddy given as loan in the off season one and a half measures will have to be repaid during the time of harvest.	Marginal farmers agricultural labourers	Affluent farmers and traders	This Practice is widely prevalent in Cannanore district
XIV.	Commodity loans	60–120 %	Instead of cash, readily convertible commodities like pepper or paddy is given as loan. The price of the commodity is fixed by the lender, generally at double or trible the prices and repayment have to be made within a short period. The burden of converting the commodity into cash is the responsibility of the borrower. The repayment is always in cash.	Marginal farmers agricultural labourers	Affluent farmers and Traders	In Wynad area of Kozhikode and Cannanore district this practice is very common.
XV.	Advance sale of harvest wages in kind	100–200 %	In this system, the agricultural labourers take cash loans from the neighbouring households and petty traders on condition that the loan will be repaid in paddy from the kind wages received at the time of harvest.	Agricultural labourers	Affluent neighbours small traders	
XVI.	Credit sale of raw materials or cash advances for the purchase of raw materials among ,, ,,	40–200%	Under this system self employed handloom weavers' handicraft workers coir workers etc., get either raw materials such as yarn, rosewood, horn, retted, husks etc., on credit or cash advances for the purchase of these materials on condition that the finished products will be sold to the lender. The lender in some cases charges higher rates for raw materials and in others buys finished products at lower rates than the prevailing market rates and realises high rate of interest.	Handloom weavers handicraft workers coir workers etc.	Traders merchants producers and weavers	

(1)	(2)	(3)	(4)	(5)	(6)
XVII. Cash advances in lieu of work		This practice is prevalent among different types of artisans like handicraft workers, handloom weavers, coir workers, blacksmiths, goldsmiths etc, The cash advance is recouped by adjustment in wages. Generally, wages will be reckoned at less than the prevailing wage rates.	Handicraft workers, hand loom weavers coir workers blacksmiths, goldsmiths etc.	Producers traders etc.	
		Landless labourers also get advances in lieu of work from forest contractors or from their agents with the understanding that the labourers work for them at far off places, usually in forest areas. All the expenses of the labourers will be met by the contractor and will be adjusted against their daily wages generally, lower than the prevailing rates.	Landless labourers	Forest contractors or their agents	This practice is prevalent in Kasargod areas of Cannanore. District

Commercial Banks

Kerala has been fortunate enough from the beginning, to have a well advanced banking system, when most of the other States (excepting port towns) found their banking development at its infancy. It is interesting to note that the indigenous banks, instead of competing with the commercial banks, have themselves developed into commercial banks. As a result a large number of commercial banks came into existence in the State—most of them were small banks in rural and semi-urban areas and played an important role in the economic development of different parts of the State since the beginning of the century. Albeit some of the small banks had operated for a very short period and were among themselves competing, a majority of them lived for a pretty long period contributing substantially to the economic life in the State.

In spite of a series of bank failures in 1930's, the period during and after the Second World War witnessed an exhilarating record of performance by the banking sector in Kerala. The State has been fortunate enough from the beginning, to have deposits mainly from agriculture. The pattern of banking growth abundantly reveals the interesting features which are not seen in any other parts of the country.

Kerala, no doubt, was one of the most advanced States in India regarding banking where even as early as 1955, every 15,000 people had a branch of the Bank, whereas all India average had not yet reached that level even with a phenomenal rise in bank branches after the nationalisation. This trait may be attributed mainly to the commercial rivalry that resulted in each community establishing its own bank.

The commercial character of the agriculture has encouraged the banks to go into the rural areas even at the time when most of the banks were urban-oriented. As a result as many as 466 branches of the banks out of the total 605 number of

offices during July 1969, were operating in rural and semi-urban areas in the State. Only 10 per cent of the total branches had their base in metropolitan areas.

That the banking sector in Kerala had mainly a "rustic character" even in the past will also be revealed if we study the pattern of credit advances. According to the Travancore Cochin Banking Inquiry Commission (1956), the credit advances made by the commercial banks in the State towards agriculture was 6.9 per cent when the performance of the banks in the whole country was as negligible as 0.1 per cent. Should we take the Kerala based banks alone into account, the agricultural loans disbursed by them was even much higher (9.8 per cent) at the end of 1955. The predominant rural character of the banks in Kerala helped monetisation in the rural economy.

Within the past two decades, the structure of banking industry has been significantly broadened in Kerala through the unprecedented expansion activities. This recent spectacular growth of the sector has been of a long standing nature with a few stable commercial banks originating in the State which have unhesitating and confidently contributed to the development of agriculture and the tertiary sector. As already indicated earlier, in mobilisation of funds especially from the rural areas and infusing greater administrative efficiency, the history of banks reveal that out of the 116 Kerala-based banks which were operating in 1959, only 9 banks survived after a compulsory process of merger or amalgamation during the former half of 1960's. The names of the banks registered in Kerala and statistics relating to Banks in Kerala as on 31-3-1980 is given in the appendix. All the fourteen nationalised banks, the State Bank of India and its five subsidiaries—State Bank of Travancore, the State Banke of Mysore and State Bank of Saurashtra—State Bank of Hydrabad and State Bank of Bikaner and Jaipur and sixteen private banks are operating in the

State. Apart from these banks of Indian origin, the National and Grindlays Bank and the Chartered Bank of U. K. have their office in Cochin. It is evident, therefore, that Kerala has a bunch of commercial banks operating with multifarious activities in different parts of the State, linking thereby the banking activities of this region to entire banking net work in the country.

After the nationalisation of commercial banks, a high degree of reliance has been placed on banks in mobilising the untapped resources in rural areas, disbursing the credit to the susceptible priority sectors and weaker sections, and extending the banking activities by opening bank offices in hitherto neglected regions to make them an instrument in achieving balanced growth.

When judged by these criteria, commercial banks in Kerala have shown remarkable performance in recent years especially after the nationalisation. The deposits mobilised by the commercial banks in the State which stood at Rs. 51.72 crores in December 1962 has increased to Rs. 760.52 crores in December 1977 and thereby it showed a slight improvement in the State's share in total deposits mobilised in the country from 2.5 to 3.6 per cent.

The advances made by the commercial banks in the State increased 1400 per cent (Rs. 33 crores to Rs. 466 crores) during the same period of 15 years and thus it witnessed a growth faster than those in the entire country. This has resulted in an increase in the share of Kerala in All India credit disbursement from 2.3 to 3 per cent during the period under review.

However, as a consequence of relatively faster growth in deposits since 1962, the credit-deposit ratio has slightly fallen from 63 to 61 per cent during the period under review.

The most striking feature of all, however, is the conspicuous role of commercial banks in their branching activities in Kerala, a trend particularly observed after the nationalisation in 1962, only with 250 offices, banks were carrying on their activities. Before the period of nationalisation their activities of branching was modest and selective. However, in the period

following immediately after the nationalisation in 1969, and after the introduction of the Lead Bank Scheme in 1970, there is a big leap forward in branch expansion by commercial banks. As a result, the offices of banks have more than doubled wtihin a span of six years. In other words, approximately 1350 additional branches have been opened by the banks in the State during the period between 1968-77. This vigorous branch expansion has resulted in reduction in the State average of population served per bank office from 68,000 in 1962 to 11,000 at the end of 1977, whereas the corresponding figures of the country as a whole are 95,000 and 23,000 respectively. Throughout these years, Kerala has maintained its share in branch expansion much higher than that of national average. According to the Banking Statistics published by the Government of India upto June 1979, the total number of bank offices rose to 2,098. It also reveals that since the nationalisation, increase of bank offices had been to the tune of 152 till the end of June 1979.

The following is the table of comparative indicators of the progress of banking in Kerala and the entire country. It affords the convenient way as a pointer to the progress of the commercial banks in the decade and a half after 1962.

The trends in deposit accretion and credit disbursement reveal, the phenomenal growth in per capita deposits that have grown to Rs. 357 from Rs. 31 during the period of 15 years and per capita credit disbursement which has steadily picked up in the State and has reached very close to the corresponding all India per capita figures.

Of the 1818 new offices opened since 1962 in the State, nearly 1500 have opened after July 19, 1969. Nevertheless, the pronounced spurt in the bank branches is more visible in rural areas during this period. The relevant data are presented in Table 2.

Between June 1969 and June 1979, more than half of the new offices were opened in rural centres; an increase from 26 per cent of the total to 45 per cent. Regarding semi-urban areas, the additional branches opened are 518. The share of urban and metropolitan offices has declined from 22.9 to 15.6 per cent in the same period. Kerala has a larger percentage of branches operating in rural areas than that of national average.

Indicators of the Growth of Banking in Kerala (1962—1977)

Indicators	Kerala			India		
	1962	1968	1977	1962	1968	1977
Deposits (Rs. lakhs)	5,172	14,537	76,052	2,08,148	4,20,210	21,21,394
Advances (Rs. lakhs)	3,250	9,519	46,611	1,52,778	3,07,340	14,31,610
Branches (Number)	250	572	1,914	4,612	7,322	26,996
Credit-Deposit Ratio	63	65	61	69	71	72
Deposit per branch (Rs. lakhs)	21	25	40	45	59	79
Advances per branch (Rs. lakhs)	13	17	24	31	41	57
Per Capita Deposits (Rs.)	31	72	357	47	85	387
Per Capita Advances (Rs.)	37	40	219	52	60	279
Population per office (000's)	68	35	11	95	69	23

As a corollary to the above phenomenon, the rural offices of commercial banks in Kerala also have an exceptional record of performance when we compare them with rural branches in the rest of the country.

According to the special emphasis given to the priority sector advances, the commercial banks in Kerala have boosted up their lending in this area. While the public sector banks have lent only Rs. 27 crores to these sectors at the time of nationalisation, it had increased to Rs. 197.94 crores at the end of December 1978.

The banks, particularly in Kerala, have shown an enlivening record of performance in the backward areas after the nationalisation. It may be contended that nowhere in India do we find such an even development of banking infrastructure both in the backward and the advanced areas than in the State. It may chiefly be attributed to the rural traits of the banks in the area.

The banks have opened their offices after the nationalisation, remarkably in the backward districts, and as a result, the operating branches of the banks have more than doubled, in these areas.

The banking sector in Kerala has achieved progress in recent years that has no comparison in the banking history of the country. Urban orientation of the banks, though a main feature in other States, does not appear to be very prominent in Kerala even before the nationalisation. Performance of the banking sector in the backward region, especially in mobilising the deposits, is really commendable. This phenomenon reflects the savings consciousness of the people in the State. May be, this is due to the literacy rate in Kerala, the highest among all the States. It is with regard to the credit deployment that some inequalities are found to exist. Credit-deposit ratio is not encouraging in the backward districts, thus revealing the diversion of resources from the backward districts to the industrially advanced ones. It may not be a difficult task to the banks, however, in Kerala to reverse this trend by conscious efforts, since they have cluster of offices of various banks even in the backward districts.

Since 1975, a new category of banking institutions has been brought into existence in the form of regional rural

banks to have increased local involvement of the banks for meeting the credit requirements of weaker sections, small and marginal farmers, landless labourers, artisans and small entrepreneurs. These banks have limited area of operation, their staff are drawn from the area or the State of their operation and they are required to lend only to weaker sections of the society. They have access to liberal refinance facilities from the National Bank for Agriculture and Rural Development (NABARD) and each of the banks sponsoring its regional rural banks. These were opened as a supplementary agency to co-operatives in dispensing rural credit. The Banks would combine the local feel and familiarity with rural problems, which the co-operatives encounter and the business acumen, ability to mobilise deposits, access to centralised money markets and modernised outlook which the commercial banks have. These banks are a support to the old co-operatives and newly opened commercial banks. Each Regional Rural Bank has an authorised capital of Rs. 1 crore and a paid up capital of Rs. 25 lakhs. The share capital will be contributed by the Central Government, the State Government and the sponsoring commercial bank in the following proportion 50:15:35. There are two such banks operating in the State—the North Malabar Gramin Bank and the South Malabar Gramin Bank. For facilitating co-ordinated effort on the part of all the banks to increase their involvement in well planned effort to promote credit based development of districts' economies and to ensure adequate support to beneficiary oriented development programmes. Lead Bank Scheme was introduced towards the close of 1969. In implementing the scheme the bank designated as the 'Lead Bank' for each district is expected to undertake district credit planning, involve other banks in the formulation of specific programme contents, allocate shares among various credit institutions operating in the district and bring about a co-ordinated effort on the part of all such institutions to deploy credit in support of identified programmes.

To secure co-ordination between the activities of different banks on the one hand and all the banks and district level agencies on the other, district consultative committees presided over by the District Collector have been set up in all the districts covered under the Lead Bank Scheme. Functional standing committees have also been set up to deal with more important issues of immediate relevance.

With the increasing role being assigned to the banks to lend active credit support to the programmes of economic development of backward classes and weaker sections, co-ordination among the banks and between the banks and developmental agencies has become quite critical. To achieve this, different forums have been created at district, State and regional levels. At the district level, there are consultative committees with Collectors as their Chairman and the Lead Banks' Officers as their conveners. At the State level, there are two forums viz., State level bankers' committee and State level co-ordination committee. While the former comprise bank officers at middle-management level, the latter also include heads of departments of the State Governments.

A branch office of the Reserve Bank of India (Department of Banking operations and Development) started functioning at Trivandrum from January 1954. The Exchange Control Department is functioning at Cochin from February 1971.

Some interesting information about the commercial banking sector in Kerala is given below:

List of Banks registered in Kerala

	Name of Bank	*Head Office*
1.	State Bank of Travancore	Trivandrum
2.	South Indian Bank, Ltd.	Trichur
3.	Federal Bank, Ltd.	Alwaye
4.	Catholic Syrian Bank, Ltd.	Trichur
5.	Lord Krishna Bank, Ltd.	Kodungalloor
6.	Parur Central Bank, Ltd.	Parur
7.	Nedungadi Bank, Ltd.	Kozhikode
8.	Dhanalakshmi Bank, Ltd.	Trichur
9.	North Malabar Gramin Bank	Cannanore
10.	South Malabar Gramin Bank	Malappuram

APPENDIX

Banking Statistics of Kerala State as on 31st March 1986

(*Rs. in lakhs*)

Name of the Bank	*No. of Branches*	*Total Deposits (Excluding Bank Deposits)*	*Of which NRE Deposits*	*Total Advances (Excluding Advances to Banks)*	*C.D. Ratio*	*Total Priority Sector Advances*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. State Bank of India	193	39219.00	12760.70	23185.00	59.12	11683.98
2. State Bank of Bikaner & Jaipur	1	326.20	4.51	78 80	24.16	65.17
3. State Bank of Mysore	6	430.00	57.15	429.00	99.77	164.62
4. State Bank of Sourashtra	1	142.19	1.23	146.65	103.14	4.75
5. State Bank of Travancore	490	87802.55	25470.00	56730.77	64.61	26404.37
6. State Bank of Hyderabad	1	111.86	8.27	55.56	49.66	16.29
Sub-total—State Bank Group:	692	128031.80	38301.86	80625.78	62.97	38339.18
1. Allahabad Bank	4	429.10	7.62	276.62	62.47	58.71
2. Andhra Bank	6	711.88	22.78	525.06	73.76	127.00
3. Bank of Baroda	28	8409.04	4659.54	3713.40	44.16	1771.63
4. Bank of India	13	3508.13	929.89	1975.80	56.32	714.59

(1)	(2)	(3)	(4)	(5)	(6)	(7)
5. Bank of Maharashtra	3	343.17	8 77	266.26	77.59	161.45
6. Canara Bank	186	39081.00	11792 00	27082.00	69.30	17071.00
7. Central Bank of India	62	10255 32	2527.62	7128.89	69.51	3916.23
8. Corporation Bank	36	3587.67	526 09	2703.82	75.36	1334.31
9. Dena Bank	9	815	N.A.	417.00	51.17	176.00
10. Indian Bank	67	12033.50	3442.41	8133.44	67.58	4892.43
11. Indian Overseas Bank	83	20476.61	10796.77	7845.61	38.32	4341.51
12. New Bank of India	4	487.75	65 15	322.63	66.15	87.61
13. Oriental Bank of Commerce	2	288.23	..	92.15	31.97	30.26
14. Punjab National Bank	7	1164.24	119.18	765.09	65.72	188.99
15. Punjab & Sind Bank	2	232.24	7 77	278.54	119.94	8.69*
16. Syndicate Bank	95	18934.85	5035.98	11892.42	62.81	6184.09
17. Union Bank of India	106	12014.00	1606.93	9691.00	80.66	6060.00
18. United Bank of India	2	135.36	8 38	115.17	85.08	68.43
19. U.C.O. Bank	17	1876.89	428.20	2984.05	158.94	785.15
20. Vijaya Bank	60	6157.35	1167.44	3092.30	50.22	1767.13
Sub-total Nationalised Banks:	792	140941.33	43152.52	89301.25	63.36	49745.21

(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Bank of Madurai Ltd.	6	371.13	11.47	643.38	173.36	275.75
2. Bank of Thanjavur Ltd.	3	126.17	0.17	48.49	38.43	22.14
3. Bank of Tamil Nadu Ltd.	1	237.01	Nil	43.06	18.17	8.15
4. Bharat Overseas Bank Ltd.	2	143.09	26.58	127.56	89.15	31.37
5. Catholic Syrian Bank Ltd.	181	15495.00	3063.83	8571.00	55.32	3606.29
6. The Chartered Bank Ltd.	2	1314.72	574.10	1521.38	115.72	396.42
7. Dhanalakshmy Bank Ltd.	100	5126.16	Nil	2789.65	54.42	762.75
8. The Federal Bank Ltd.	265	23531.84	N.A.	13766.14	58.50	4500.00
9. Grindlays Bank Ltd.	2	825.75	300.82	1334.67	161.63	246.31
10. Karnataka Bank Ltd.	9	695.49	N.A.	574.44	82.60	316.76
11. Karur Vysya Bank Ltd.	3	91.62	2.64	71.68	78.24	44.81
12. Lakshmi Vilas Bank Ltd.	4	113.81	4.80	44.26	38.89	8.02
13. Lord Krishna Bank Ltd.	64	2712.07	..	1393.46	51.38	322.44
14. Nedungadi Bank Ltd.	94	5182.32	545.18	2692.25	51.95	941.40
15. Parur Central Bank Ltd.	48	1848.64	Nil	1207.26	65.31	287.49
16. South Indian Bank Ltd.	177	17115.42	3319.51	10263.00	59.96	2812.85
17. Tamil Nadu Mercantile Bank Ltd.	4	357.66	0.75	368.05	102.91	167.87
18. Vysya Bank Ltd.	10	1355.71	130.86	937.86	69.11	187.60
Sub Total—Private Sector Banks	975	76643.61	7980.71	46397.59	60.54	14938.42

(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. North Malabar Gramin Bank	118	1917.79	Nil	2860.72	149.17	2766.53
2. South Malabar Gramin Bank	144	2516.00	Nil	4760.24	189.21	4514.21
Sub Total—RRBs:	262	4433.79	Nil	7620.96	171.88	7280.74
Kerala State Co-operative Bank		10090.00	Nil	13169.00	131.30	12194.51
State Bank Group:	692	128031.80	38301.85	80625.78	62.97	38339.18
Nationalised Banks:	792	140941.33	49152.52	89301.25	63.36	49745.21
Private Sector Banks:	975	76643.61	7980.71	46397.59	60.54	14938.42
RRBS:	262	4433.79	Nil	7620.96	171.88	7280.74
Total Scheduled Commercial Banks:	2721	350050.53	89435.09	223945.58	63.98	110903.55
Sub Total—KSCB		10030.00	Nil	13169.00	131.30	12194.51
Grand Total	2721	360080.53	89435.09	237114.58	65.85	122498.06

Co-operative Credit Societies and Banks:

The Co-operative movement began in India with the Co-operative Credit Societies Act 1904. The earliest societies began functioning in various parts of the State from 1910 onwards.

Co-operatives have covered practically all important economic activities in Kerala. The Co-operative structure in Kerala comprises two broad sectors viz. (1) The agricultural credit sector, and (2) The non-agricultural credit sector including Urban Banks and Employees Credit Societies. The Agricultural Credit Sector has again two wings one intended to dispense short term and medium term agricultural loans and the other for disbursing long term agricultural loans. The Kerala State Co-operative Bank is the apex institution in the co-operative credit sector with 14 District Co-operative Banks at the district level and 1566 Primary Agricultural Credit Societies at the primary level providing short and medium term loans for agricultural purposes. The long term credit structure consists of the Kerala Co-operative Central Land Development Bank at the State level and 36 Primary Land Development Banks at the base level for advancing long term loans[1].

Of the co-operatives in the State, the credit societies are in the forefront. The 1566 primary agricultural credit societies have registered a tremendous growth. The total membership of the primary agricultural credit societies is nearly 49 lakhs. The average membership is 3,121, and the average share capital is Rs. 2.78 lakhs. The annual deposit received per society is Rs. 15.63 lakhs, and the per member deposit is Rs. 501. The working capital per society is Rs. 40.33 lakhs. The total loan amount advanced by the societies was Rs. 34.76 crores in 1983-84, and the loan overdues was Rs. 68.99 lakhs.

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[1] The present land development banks were originally conceived as Land Mortgage Banks and functioned as such. The original object of the Land Mortgage Bank was to help farmers to pay off their old debts by giving them long term advances on easy terms. Thus the primary mission of the land banks was the redemption of old debts. At the same time loans were also given for development purposes like permanent improvements on land, provision of irrigation facilities etc. But the major portion of the advances was meant for liquidation of debts.

Select Indicators of the credit operation of the Agricultural Credit Societies

	Details	*As on* 30-6-1983	*As on* 30-6-1984
1.	No. of Societies	1,569	1,566
2.	No. of members (lakhs)	48	49
3.	Paid up share capital (Rs. in lakhs)	3,801	4,343
4.	Statutory Reserves	443	504
5.	Other Reserves	1,597	2,105
6.	Deposits	19,994	24,482
7.	Other Borrowings	13,813	16,331
8.	Working Capital	52,502	63,153
9.	Loans advanced during the year (Rs. lakhs)	26,962	34,764
	(a) Short term loans	21,733	29,117
	(b) Medium term loans	4,670	5,331
	(c) Long term loans	559	316
10.	For agricultural purpose alone	14,711	18,565
11.	Loans outstanding at the end of the year	27,669	34,190
12.	Loans overdue	5,941	6,899
13.	No. of societies worked on profit (No.)	876	900
14.	Net profit for the year (Rs. lakhs)	543	528
15.	No. of societies worked on loss (Nos.)	685	650
16.	Loss sustained (Rs. lakhs)	595	760
17.	No. of Societies without profit/loss (Nos.)	8	16
18.	Long term loans issued by Primary Agricultural Development Banks (Rs. lakhs)	2,183	2,389

Select Indicators of the performance of Agricultural Credit Societies

	Indicators	As on 30-6-1983	As on 30-6-1984
1.	Average Membership per Society (Nos.)	3,052	3,121
2.	Average share capital per Society (Rs. lakhs)	2.42	2.78
3.	Average deposit per society (Rs. lakhs)	12.11	15.63
4.	Average deposit for member (Rs.)	397	501
5.	Average working capital per society (Rs. lakhs)	33.46	40.33
6.	Average loan per member (Rs.)	563	711
7.	Percentage of Borrowing Members to total members (during the year)	37.96	41.57
8.	Average loan advanced per advancing Society	18.87	23.62
9.	Average loan advanced per borrowing member	1,483	1,711
10.	Percentage of overdues to outstanding	21.47	20.18

Source:—Office of the Registrar of Co-operative Societies.

As against an estimated credit requirement of Rs. 151 crores for seasonal agricultural operations the primary agricultural credit societies have advanced Rs. 103.68 crores. An intensive drive for improving further the performance of the societies has been undertaken under the Prime Minister's new 20 point programme. Reorganisation of the primary societies to achieve viability within a reasonably short period has been undertaken. Now 1,413 of the societies are viable. Simplification of loaning procedure, intensive collection drive, incentive for prompt repayment and augmentation of own resources are some of the more important steps taken to prepare the societies for the tasks under the 20 point programme.

In the rate of recovery of advances also, the primary agricultural credit societies have been doing well. The overdues to demand has been below 20 per cent during the past three years 1981-84.

A special drive for tapping deposits has been undertaken annually. During 1982-83 the primary agricultural credit societies undertook a 45 day deposit mobilisation campaign and collected additional deposits of Rs. 60.25 crores. In 1983-84, within 45 days the credit institutions were able to mop up Rs. 94 crores, half of it in the form of term deposits.

Membership of the Scheduled Castes and Scheduled Tribes in primary agricultural credit societies constituted 8.61 per cent and the loans advanced to them worked out to 2.71 per cent. Attempts have been made to increase the membership of this section of the people so that they will derive a larger share of the benefits.

A scheme for grants to the Scheduled Castes and Tribes to the extent of 90 per cent of the share value has been launched to enable them to enrol themselves in primary agricultural credit societies, Urban banks and Harijan societies.

The primary agricultural credit societies have been developed into multipurpose societies undertaking a variety of services apart from dispensing credit. These include distribution of fertilizers, pesticides, seeds, agricultural machinery, essential consumer articles and also loans for construction of houses for weaker sections. Co-operatives account for 46 per cent of the total fertilizer distribution in the State.

The primacy of position of the primary agricultural credit societies in the State will be evident from the following data for 1981-82.

		Average	
		All India	*Kerala*
1.	Membership (number)	610	2,965
		(Rs. in lakhs)	
2.	Paid up share capital	0.58	2.14
3.	Deposits	0.28	9.71
4.	Loans issued	1.76	15.22
5.	Working capital	4.07	26.53
6.	Overdues to demand	43.20%	18.62%

The 36 primary land development banks in the State have been able to reorient their loaning portfolio to give emphasis to schematic lending rather than sporadic lending. In 1982-83, these banks could advance a total of Rs. 20.01 crores, of which Rs. 13.43 crores account for schematic lending. The advances have been mostly for productive purposes like minor irrigation, purchase of agricultural machinery, construction of farm houses, cattle sheds, fencing, dairy, poultry and fisheries. The advances for non-productive purposes have been kept low at Rs. 3.68 lakhs.

The recovery performance of the primary land development banks has been creditable. Except for five, the others could recover more than 75 per cent of the demand. These banks, therefore, qualify for unrestricted borrowings. In the case of the other five, though the percentage of outstandings exceeds 25 they still continue to qualify for borrowings at previous year's level. An intensive drive for recovery has been undertaken in these cases.

Minor irrigation has been given added importance, considering the need for stabilising crop production. Apart from financing schemes like the digging of wells, renovation of old wells, erection of pumpsets, pump houses, storage by the members of primary land mortgage banks, the Kerala Co-operative Central Land Development Bank has been financing the State Electricity Board for energising pumpsets. During the first phase of the programme a total of 11,200 pump sets were energised. The second phase aims at 7,347 pumpsets.

Non-agricultural credit societies such as urban co-operative banks and employees' credit societies have been serving a large section of the population, dispensing credit to small scale industries trade and commerce, consumption loans and for debt redemption. Out of the 643 societies, 51 come under the Banking Regulation Act and are subject to supervision and control by the Reserve Bank of India. With a paid up share capital of Rs. 4.45 crores and total deposits of Rs. 41.52 crores and advances totalling Rs. 39.64 crores, these societies have acquired considerable importance in the banking system. A special drive has been undertaken not only to augment the resources position of the urban banks but also to reorient their loaning portfolios so that 60 per cent of their advances will be for the priority sectors in the course of the next two years.

The financing banks have grown into viable institutions capable of giving business support to primary societies of all types. These societies have grown strong financially and become viable over the years.

General and Life Insurance

The first step in regularizing insurance business was taken in 1912, when the Indian Life Insurance Companies Act was passed. The provisions of the Act soon proved inadequate and a comprehensive Insurance Act was promulgated in 1939. The Act was substantially amended in 1950. In 1956, Life Insurance Companies numbering about 250 were nationalized. A single corporation was set up to take over the entire life insurance business. General Insurance Companies remained in the private sector. In 1968, a scheme of social control was introduced in the form of insurance amendment Bill which was later passed by Parliament. These measures were considered insufficient and in 1971 Government took over management of general insurance companies through an ordinance. The companies were finally nationalized in 1972. Thus the entire business life and general is now in the public sector. While Life Insurance is handled by a single corporation, general insurance consists of the General Insurance Corporation of India (G. I. C.) which is a holding Company with essentially a supervisory and advisory role, and four subsidiaries, viz., National Insurance Company Ltd., New India Insurance Company Ltd. Oriental Fire and General Insurance Company and United India Insurance Company Ltd. These Companies conduct all classes of general insurance business in competition with each other.

State Insurance Department

One of the leading agencies in the field of general and life insurance in Kerala State is the State Insurance Department with its headquarters in Trivandrum. The department is in the charge of the Director of Insurance, with the administrative control being exercised by the Commissioner and Secretary, Finance. The Department is recognized as an insurer for underwriting all types of General Insurance business as any other subsidiary company of the General Insurance Corporation of India constituted under the General Insurance (Nationalisation) Act, 1972. The Department is an implementing agent

for Pilot Crop Insurance Scheme in Kerala State. Besides it is authorised to underwrite insurance business of all the State Industrial undertakings and other industrial units in which the State Government or the other state financial institution have sizeable financial interest. The following are the types of General Insurance activities of the Department.

(1) *Fire Insurance*.—Buildings, Plant and machinery are eligible for insurance. Besides cover against fire risks the insured are offered coverage against allied perils such as riot and strike, damage risks, explosion risks, cover against typhoon, hurricane, flood and other natural calamities. The Department underwrites the business of Fire Insurance in respect of buildings belonging to individuals who avail of loan under middle or low income group housing schemes and the buildings mortgaged to the Co-operative Societies financed by the Government of Kerala, Kerala State Housing Board, Co-operative Land Development Bank, Kerala Financial Corporation, Kerala State Industrial Development Corporation, Director of Industries and Commerce etc. Out of the total risks underwritten by the State Insurance Department, 20% is ceded to the General Insurance Corporation as per statutory requirement since 1st April, 1976. To minimise the outgo of the premium income of the department, there is a scheme for accepting retrocession from the General Insurance Corporation on a reciprocal basis.

A statement on the activities of the Department in 1985-86 is given below:

1.	Fresh Policies issued	3,477
2.	Policies renewed	1,908
3.	Claims settled	Rs. 4.20 lakhs.
4.	Receipts	Rs. 141.58 lakhs.

(2) *Marine Insurance*.—The class of insurance transacted relate to Marine Hull Insurance, Marine Cargo (ocean voyage, costal voyage) insurance, Rail and Road Transit risk insurance and storage-cum-creation insurance. 880 policies under Marine Cargo Insurance and 175 under Marine Hull insurance were issued in 1985-86. The premium receipts during this period amounted to Rs. 78.80 lakhs.

(3) *Miscellaneous Insurance*.—The classes of insurance transacted (i) Boiler Explosion, (ii) Machinery Breakdown,

(iii) Burglary, (iv) Cash in transit and cash in safe, (v) Personal Accident, (vi) Public liability, (vii) Air craft, (viii) Workmen Compensation, (ix) employees liability, (x) Fidelity Guarantee, (xi) Motor comprehensive, (xii) Act liability (Third Party of motor vehicles). The statement below indicates the level of activity in 1985-86.

	Class of Insurance	*Number of policies, renewals endorsements*	*Number of claims registered*	*Number of claims settled*
1.	Miscellaneous including Fidelity Guarantee Bonds excluding Act Insurance	1,500	33	40
2.	Motor Comprehensive motor cycle, private car & commercial vehicles	2,000	92	105
	Total	3,500	125	145

3. **Premium receipts.** Rs. 40.27 lakhs.

(4) *Act liability Insurance (Motor vehicles)*.—The Department issues Act liability insurance policies in respect of vehicles belonging to the concern fully owned by the Government and those in which Government has substantial financial interest. Besides the Department also provides compensatory relief to the victims of motor accidents through the Tahsildars in the Revenue Department. This payment relates to motor accident cases in which the State Insurance Department has no liability. In 1985-86, an amount of Rs. 10 lakhs was paid towards compensation to the injured victims of motor accidents or to the legal heirs of deceased.

In addition to the above categories the Department has introduced the personal Accident Insurance Scheme on year to year basis to the Governor, the Chief Minister, Ministers. Speaker and Deputy Speaker of the Legislature, the Leader of the Opposition and major heads of Departments. Others who travel by air on Government business will avail the Air Insurance Coupon.

State Life Insurance Branch (Official)

Consequent on the formation of the Life Insurance Corporation of India on 1st September 1956, the Public Branch of the State Life Insurance Department was taken over by the Life Insurance Department. But the Department continues its business in the official branch. Compulsory life insurance scheme has been introduced for new entrants in Government service, since August 1976. The scheme aims at utmost profit to policy holders—low rate of premium and high bonus are the features of this. The total policies in force by the end of March 1986 as 59,787 for a sum assured of Rs. 32.86 crores. The subscribers are allowed to avail loans at a nominal interest. The premium is deducted from the salary of the insured.

Group Insurance Branch

The Kerala State Employees Group Insurance Scheme came into force from the first day of September, 1984. This scheme is intended to provide for the State employees, at a low cost and on a wholly contributory and self financing basis, the twin benefits of an insurance cover to help their nominees in the event of death while in service and a lump sum payment to augment their resources on retirement. The total number of persons enrolled in the Group Insurance Scheme during 1985-86 was 49,274.

The Kerala Advocates' Clerks Welfare Fund Scheme

The Kerala Advocates' Clerks Welfare Fund Scheme came into force from the first day of January, 1985. This scheme is intended to provide for the welfare of the Advocates' clerks, the twin benefits of a cover to help their families in the event of death while in service and a lump sum payment to augment their resources on retirement after a service of 30 years or on attainment of 60 years of age whichever is earlier. The total number of memberships issued to the Advocates' clerks upto 31-3-1986 is 317.

The Kerala State Crop Insurance Fund

Kerala State Government has adopted the scheme whereby proper financial protection can be given to the farmers. This crop insurance scheme is available to farmers who avail of loans for the cultivation of paddy in Kerala from co-operative institutions, commercial banks, and Regional Rural Banks.

Kerala witnessed unprecedented floods during the monsoon season in 1985. As a result a number of farmers suffered crop damage. Based on the crop cutting data made available by the Director of Economics and Statistics shortfall in yield was found in 8 taluks of Kerala. Accordingly indemnity payable under the scheme was worked out to be Rs. 37,89,755.44. It will directly benefit 7,813 farmers who have availed of loans for cultivation of paddy from various banking institutions. Since the transactions have been completed through the banks and the scheme envisages payment to the banks only, this amount is being released to various banks, who in turn will pay to the individual farmers. This compensation is being met by the General Insurance Corporation of India and the Kerala State Crop Insurance Fund in the proportion of 2:1.

This scheme has proved to be a boon to the farmers who face the vagaries of nature. During Kharif Season 1985, 20,720 farmers were covered under the Insurance Scheme in Kerala.

Life Insurance Corporation

The activities of the Life Insurance Corporation of India are outlined below:

As in the other parts of the country, life insurance business was transacted in Kerala mainly by private insurers and their activities were confined to certain urban centres before the business was nationalised. Most of the leading insurers in India had their Offices in Kerala. In Travancore (after integration of the States in 1951, Travancore-Cochin) State Insurance Department was the main Government Agency functioning in Kerala in the field of life insurance in pre-nationalisation days.

By an Act of Parliament in 1956, Life Insurance Corporation of India was established amalgamating 245 Insurance Companies in India, big and small, with the prime objectives of (i) Spreading the gospel of life insurance in every direction as far and wide as possible and (ii) mobilising the savings of the people and to channelise the same towards nation building activities.

L. I. C. came into existence on 1st September 1956, exactly two months prior to the birth of Kerala State as a result of States Reorganisation. Trivandrum Division of L. I. C. came

into being along with other 31 Divisions in the country on September 1, 1956 itself. Until 31st May 1976, the Division comprised the area within the present Revenue Districts of Trivandrum, Quilon, Pathanamthitta, Alleppey, Kottayam, Idukki, Ernakulam and Trichur and parts of Palghat and Malappuram Districts. The Branches in the remaining parts of Kerala were controlled by the Divisional Office at Coimbatore. Trivandrum Division started functioning with Branches at Trivandrum, Kottayam and Ernakulam. In 1957, Trichur, Alleppey and Quilon Offices were opened. More Branches were opened in later years. Through the bifurcation of Coimbatore Division, a new Division of L. I. C. was set up in Kerala with Kozhikode as its headquarters, in April, 1973. Three Branches of Trivandrum Division, viz., Trichur, Irinjalakuda and Kunnamkulam were transferred to Kozhikode Division with effect from 1st June, 1976 for administrative convenience. The third division of the Life Insurance Corporation started functioning from August 25, 1986. It covers the four districts of Idukki, Ernakulam, Trichur and Palghat. It serves 85 lakh persons through 16 branches. One more branch at Thodupuzha in Idukki district.

In addition to insuring individual lives, L.I.C. is extending insurance protection on mass basis also. Group Schemes provide an instrument to extend life insurance cover to large number of lives belonging to organised homogeneous groups. The Corporation is providing protection of insurance and benefit of enhanced death gratuity to the workers belonging to weaker sections of the Society through these schemes.

Erstwhile Insurers were mainly interested in catering to the needs of urban populace were insurance selling was profitable and interior rural areas were largely neglected. Nationalisation witnessed a shift in this thinking and culture. As a result, a good number of offices were opened in the subsequent years. Most of the functions hitherto performed by the Divisional Office have now been decentralised to the Branches with a view to bring policy servicing to the door steps of the policy holders. A scheme called Organisation Improvement Cell involving further decentralisation is being implemented and the Branches will have to play more significant role in the coming years for shaping the destiny of life insurance business.

L. I. C. offers different plans of insurance to the insuring public such as Endowment Assurance, Whole Life Assurance,

Multi-purpose, Money Back, Marriage Endowment, Educational Annuity, Children's Deferred Assurance, Children's Anticipated policy, Progressive Protection, Cash & Cover, etc. Government of India allows tax rebate for savings through life insurance and this is a substantial relief for payers of Income Tax and Wealth Tax. L. I. C. has made arrangement for the deduction of Insurance premium from the salary of a large section of salaried class. A Scheme by name Kerala Government Salary Deduction Scheme was introduced in 1958 with the sanction of Kerala Government to facilitate convenient payment of insurance premium by way of deduction from the salary of the employees of Kerala Government, Kerala State Road Transport Corporation and Kerala Agricultural University. At present more than one lakh policies come under this Scheme. Moreover, Salary Savings Scheme of L. I. C. exists in 2500 institutions in the area of operation of Trivandrum Division. These institutions include schools, colleges, banks, other commercial firms, hospitals and industrial undertakings. A total number of 168,000 policies come under the purview of this Scheme.

Claim Settlement is a very important subject to policyholders. Delay in settlement of claims is frustrating for the claimants and this is the area where complaints mainly arise. It is the fundamental obligation of L. I. C. to discharge its responsibilities in respect of settlement of claims with minimum delay. The percentage of outstanding claims at the end of the financial year to the claims intimated during the year serves as a broad index of the speed with which claims settlement operations are carried out. A reduction in the index reflects an improvement in the place of settlement of claims.

Before nationalisation the percentage of claims outstanding to claims intimated for 7 leading insurers ranged from 36 to 75 per cent with an average of 47 per cent. This ratio was 57% during the year L. I. C. commenced operations. With persistent efforts, Corporation has succeeded to bring this ratio to a low level. Trivandrum Division's ratio as on 31st March, 1984 was 11%. This ratio compares favourably not only with that of erstwhile insurers but also with that of reputed foreign insurers. This is in spite of the enormous increase in volume of claims settlement.

Prior to Nationalisation, the insurers were required to make an actuarial valuation of their assets and liabilities at

least once in three years. In terms of the Life Insurance Corporation Act 1956, the Corporation has to conduct valuation at least once in two years. 95% of the surplus disclosed as a result of the valuation is allotted as Bonus to the With Profit Policies which are entitled to share in the profit of L. I. C. and the balance of 5% of the surplus goes to the Government of India. The first valuation of L. I. C. was done as at December 31, 1957. As a result of this valuation, poicy-holders were allotted a reversionary bonus of Rs. 16 per thousand sum assured per year on their With Profit Whole Life Policies and Rs. 12.80 on their With Profit Endowment Policies. The valuation covering the period from 1st April 1981 to 31st March 1983 has revealed a surplus of Rs. 780 crores out of which an amount of Rs. 741 crores has been allocated to the participating policy-holders. The bonus rates are Rs. 65 per thousand sum assured per year for participating Whole Life Policies and Rs. 52 per thousand sum assured per year for participating Endowment Policies. Besides, as on 31st March 1986 there is another Bonus by name Final (Additional) Bonus for certain long term policies which are kept in force for full sum assured till maturity or death as the case may be.

Investment policy of L.I.C. is subject to statutory restrictions which are aimed to ensure that the policy-holders' money is channelised for public good while giving reasonable return with security to the policy-holders. At the time of Nationalisation there was pronounced concentration of investments in eastern and western regions. L.I.C. has brought about a diffusion of concentration by investing liberally in hitherto neglected areas and other backward regions. L.I.C. is now the largest single investor in the country.

Housing is one of the primary needs of the people. Therefore L.I.C. is contributing effectively towards providing finance for housing on a massive scale. In addition to granting loans to State Governments, Housing Societies, Housing Corporations, Public Limited Companies, etc., for the purpose of housing, L.I.C. is giving housing loans to its policy-holders (both present and prospective) under its Own Your Home Scheme. This scheme is intended to make loans available to policyholders for construction of houses or for purchase of recently constructed house. Loans for extension of existing houses also can be considered under the Scheme. The Scheme is in operation in several centres in addition to some approved suburbs attached to certain centres.

Primarily, the health of an individual depends on adequate supply of clean drinking water and the health of the community cannot be sustained until proper sewerage and drainage systems are evolved. L.I.C. is granting substantial loans to local bodies for this purpose. Kerala is the first State to provide, with L.I.C's. assistance, piped water in every municipal area in the State.

L.I.C. is granting loans for various other social purposes such as power generation, distribution, transport facilities, industrial development, etc. The details of L.I.C's. investments in Kerala as on 31-3-1984 are given below:

	Particulars	*Amount (Rs. in Crores)*
1.	State Government securities	27.82
2.	Land Development Bank Debentures	23.51
3.	State Electricity Board Bonds	19.02
4.	State Financial Industrial Development Corporation Bonds and Shares	7.16
5.	Other approved securities	0.30
Loans to:		
6.	State Government for development programmes	6.05
7.	State Government for Social Housing Schemes	23.15
8.	Apex Co-operative Housing Finance Societies, Housing Board and other authorities	29.86
9.	State Government and Municipalities for Water Supply and Sewerage Schemes	33.65
10.	State Electricity Board	59.47
11.	State Road Transport Corporation	5.04
12.	Sugar Co-operative Societies	0.20
13.	Shares, Debentures and Loans to Companies (Public, Co-operative and Private Sectors)	17.47
	Total	252.70

Agency unit forms the main link between the L.I.C. and its policyholders. Thus, all through the years the Corporation has taken steps periodically to professionalise its agency force. The Corporation had been recruiting from year to year a sizeable number of agents. There had, however, been drop outs for various reasons, the principal among them being the inability of quite a large number of part-time agents to do the minimum quantum of business required to sustain their agencies. Working up of an agency calls for strenuous, regular and dedicated work. The total premium collected in Kerala during 1985-86 was Rs. 65 Crores, a substantial portion of which is invested in productive schemes within the State itself. As on March 31, 1985 L.I.C. invested Rs. 325.12 crores in various schemes in Kerala. Of this, electricity schemes got Rs. 83.50 crores, water supply Rs. 48.70 crores, transportation Rs. 8.30 crores and housing Rs. 83.35 crores. Eighty per cent of the policies in 1985-86, were taken by the policy holders for the first time while 60% of the policies are sold in the rural sector. Fifty per cent of the policies are for Rs. 10,000 or less, policies for sum assured between Rs. 10,000 and Rs. 25,000 from 33% of the total. Only 3% of the policy holders have taken policies for Rs. 50,000 or more. 17 Group Insurance Schemes, covering head load workers, harijans, fishermen, milk vendors and the deaf and the dumb have also been introduced.

At present, 6.25 lakhs policies on individual lives are in force in Trivandrum Division. Lakhs of insurable men and women remain uninsured or under-insured in its area of operation. The L.I.C. is fully aware of it and it spares no effort to extend valuable insurance protection to them. In 1986-87, the Trivandrum Division plans, to do new business of Rs. 170 crores on 77,600 policies and the Kozhikode Division's, target is Rs. 147 crores.

Record of Activities of L.I.C., Trivandrum Division

Year	*No. of policies*	*Sum Assured (Rs. in Crores)*	*Employment*	
			No. of Agents	*Other Staff*
1957	32,748	8.8	..	..
1967-68	36,427	19.24	4,858	1,456
1977-78	41,941	55.53	3,262	1,354
1983-84	65,305	121.64	3,529	1,383

Note: Particulars of strength of agents and employees in 1957 are not available.

Record of Activities of L.I.C. Kozhikode Division

Year	No. of policies	Sum Assured (Rs. in Crores)	Employment	
			No. of Agents	Other Staff
1973-74	32,429	25.50	2,278	595
1983-84	55,945	103.00	3,213	1,085

The new business performed in the Kozhikode Division for the period 1978-83 is given below:

Year	No. of policies	Sum Assured (Rs. in Crores)
1978-79	11,490	44.65
1979-80	51,593	58.16
1980-81	18,314	61.70
1981-82	49,502	76.33
1982-83	50,151	87.88

The third division viz., the Ernakulam Division services about 3.5 lakhs policies. During 1984-85, the division transacted new business of Rs. 115 crores and in 1985-86, it is expected to produce business worth Rs. 156 crores.

(d) Stock Exchange

The stock exchange is a market where securities like equity shares, preference shares, debentures, gilt-edged etc., are traded. It is not a source of finance to industry or Government. By keeping the market active through spot and forward dealings, the stock exchange imparts liquidity to securities, promotes continuity of price, ensures free negotiability and thus makes them an attractive investment.

Securities quoted on the stock exchange can be classified into either cleared securities or non-cleared securities. Both types of securities can be dealt in for spot deliveries; but business for clearing can be done only in respect of the former. To get on the clearing list, securities must be fully paid up. Equity shares must have been admitted to dealings for at least three years to get on the clearing list.

The securities contract (Regulation) Act 1956 is the major comprehensive legislation which regulates stock exchanges. Stock exchanges have to be approved by Government which has powers to amend existing rules and frame new ones. Government can also institute enquiries into the affairs of stock exchanges. Excepting spot delivery, all other security contracts, to be legal, have to be effected through members of recognized stock exchanges. The Act empowers Government to prohibit any type of dealings on any stock exchange to prevent speculation.

The Cochin Stock Exchange was granted recognition to function by the Government of India from May 10, 1979. There is a council of Management to administer the activities of the exchange. The guidelines of the Stock Exchange Division of the Ministry of Finance are adhered to. Till September 1984, 49 companies have been listed in the Exchange. Most of whom are companies registered in Kerala. The total paid up value of securities listed in the Exchange (as on September, 1984) was Rs. 900 crores, whose market value amounted to Rs. 2,100 crores. There has been a new orientation though marginal in the investment pattern in Kerala. An appreciable buoyancy in the new issues market as is reflected in the spurt both in the capital raised through prospectus and in the number of companies.

(e) **State Assistance to Industrial Development**

Organised industry had its beginnings in Kerala towards the close of the 19th century. The Paper Mills at Punalur, was set up in 1888. However its impact on the economy could be termed minimal. World War I, opened up the possibility of exploiting the natural resources of the State. The Government of Travancore appointed Dr. S. G. Barker to assess the resources. After a survey, Dr. Barker's report paved the way for initiative in the field of fibres and foodstuffs, which were short lived. Under the constraints arising from World War II,

the exploration of hydro-electric resources was expedited. Active steps taken by the Diwan of Travancore particularly after 1943 such as grant of financial support to industrial ventures, stimulated the setting up of a wide range of manufacturing such as paper, cement, sugar, fertilisers, chemicals, rayons, glass, rubber, aluminium, titanium products, electrical equipments, etc. Industrial development was not of the same magnitude in Cochin and Malabar region. In 1950, there were only 6 industrial concerns in Cochin area; of these only one with a capital of Rs. 1.33 lakhs was state owned. The Government of Cochin set up an Industrial Trust Fund in 1946 for the purpose of granting financial assistance to industrial concerns. But the activities of the Fund, were restricted and subsequently it was wound up on the integration of Cochin with Travancore.

The State began to play a greater role in the industriali- sation with the initiation of planning. In the early phases, growth of industries was tardy as was reflected in the low investment outlay on industrial development. The outlay on industries formed only 2% of the total expenditure in the First Plan, 7.5% in the II and 7.9% in the III Plan. Rs. 21 crores out of the total outlay of Rs. 287 crores during 1951-1966.

State assistance consisted chiefly of Departmental assistance by way of financial aid. These proved to be inadequate and special institutional agencies have been created to promote rapid industrialisation. The leading Governmental agencies are: The Kerala State Small Industries Development and Employment Corporation (SIDECO), The Kerala Financial Corporation (KFC), The Kerala State Industrial Development Corporation (KSIDC), Kerala State Electronic Development Corporation (KSEDC), Kerala Industrial and Technical Consultancy Organization Ltd., (KITCO), Kerala State Bamboo Corporation, Ltd., Kerala Agro Industries Corporation Ltd., Handicrafts, Development Corporation of Kerala Ltd., Kerala State Handicrafts Apex Society Ltd., Kerala State Cashew Development Corporation Ltd., Kerala State Development Corporation for Scheduled Castes and Scheduled Tribes Ltd., Kerala State Coir Corporation Ltd., Kerala State Handloom Development Corporation Ltd., Kerala State Handloom Weavers' Co-operative Society Ltd., the Small Industries Service Institute (S.S.I.), Regional Research Laboratory (R.R.L.), Indian Standards Institution (I.S.I.), Industrial Development Bank of India (I.D.B.I.), Industrial Financial

Corporation of India (I.F.C.I.), Industrial Credit and Investment Corporation of India (I.C.I.C.I.).

Industrial growth has been the result of sustained efforts by the Government through the specially set up agencies. The promotional measures taken by the Government for the development of modern industrial units cover: provision of consultancy, managerial training, market support reservation of certain items for exclusive production by the small industries sector, purchase and price-preference for products of the Small Scale Industries and encouragement to the process of ancillarisation, and setting up industrial estates well equipped with the necessary infrastructure required by the Small Scale Units.

Brief particulars of these developmental agencies are given in the appendix.

At the apex of the specialised institutional structure is the Directorate of Industries and Commerce, which is the nodal agency for formulating, co-ordinating and monitoring policies and programmes for promotion and development of small scale industries. It provides a comprehensive range of facilities and services including consultancy, managerial training, common facility services, tooling facilities etc. Statutory powers have been assumed to reserve certain items for exclusive production in the small scale sector. Purchase and price preference are provided to specified products of small scale sector under the purchase policy. The Industrial Estates programme was launched in 1955 to assist the small scale industries to overcome the difficulties faced in obtaining suitable factory accommodation as also infrastructural facilities such as water and power connections etc. Through the programme, the small entrepreneurs are enabled to avail of external economics and overcome some of the disadvantages of their "small" size.

To support the development of handspun and handwoven cloth, popularly known as "khadi" as also the village industries sector with various promotional and supportive measures, the Khadi and Village Industries Board, has been set up as a statutory body. The Board helps artisans to pool their resources and avail of various common facilities such as input supply, training etc. Sales emporia have been set up in various towns as marketing outlets for goods turned out by these

artisans. The Board also organises training for artisans in improving their technology of production as well as product designs. Similarly to look after promotional matters in respect of handlooms, handicrafts, sericulture and coir respectively, Statutory Boards have been set up.

The District Industries Centre programme was launched in May, 1978 to provide an integrated administrative frame work at the district level, which would take a total view of problems of industrialisation in the district in a composite manner, by bringing all the concerned Government functionaries in a single institutional frame. The District Industries Centre is headed by a General Manager, who is supported by several managers specialising in areas such as: economic investigation, machinery, raw materials, credit, marketing, training, research and extension and village industries. The District Industries Centre prepare an annual plan for comprehensive growth of industries, based on local resources and demand, including those in the decentralised sector. The action plan highlights the industrial potential in each district which can be exploited by the new entrepreneurs.

Since the beginning of the process of planning, with its stress on industrial development, the commercial banks in India have been looking after the credit needs of the growing industrial sector and their contribution to large industries increased both in terms of volume and as a proportion of total credit. Banks, however, did not give much attention to the credit needs of the small and unorganised sector of industries as also agriculture and other rural pursuits. The Study Group of the National Credit Council, under the Chairmanship of the late Prof. D. R. Gadgil, observed that there was uneven distribution of credit to different economic sectors and virtual non-availability to certain types of borrowers, particularly small borrowers and weaker sections of the community........ The sectoral distribution of credit by commercial banks is weighted in favour of large scale industries, wholesale trade and commerce rather than agriculture, small-scale industry, retail trade and small borrowers.

Against this background, towards the end of the Sixties, it was increasingly felt by the central banking authorities and the Government of India that commercial banks had to take more interest in financing agriculture, small scale industries and

other neglected sectors of the economy, if the developmental needs of these important sectors were to receive adequate attention. Nationalisation of the major commercial banks in 1969, which helped to overcome the inhibitions of the commercial banks in financing these sectors on profitability considerations, further facilitated redirection of the flow of credit in favour of these sectors, through mandatory stipulations by the central banking authorities.

The concept of 'priority sector' came to be evolved in the late sixties to focus attention on the credit needs of certain neglected sectors of the economy—particularly in the rural areas and to ensure adequate credit facilities to them. The priority sector covers: agriculture, small scale industries, setting up of industrial estates, road and water transport operators, retail trade, small business, professionals and self-employed persons, education, housing and consumption loans. Bank credit to the priority sector has grown considerably in volume since the early seventies, alongwith the extension of bank net-work into the rural areas, under the mandatory stipulations made by the central banking authority in India.

General policy-guidelines were issued in 1974, which stipulated that the public sector banks should, by March 1979, extend credit to priority sectors to the extent of at least one-third of their total outstanding advances. This target was achieved in March 1981.

The target in respect of landing to priority sectors to be achieved by March 1985 was raised further to 40 per cent of the aggregate bank advances in October 1980. Banks were also expected to ensure that, on an incremental basis, 40 per cent of credit was extended to the priority sector.

Within the overall target, the following sub-targets were laid down:

(a) 40 per cent of the priority sector lendings should be in favour of the agricultural sector.

(b) 50 per cent of the target lending by commercial banks to agricultural and allied agricultural activities should be provided to small and marginal farmers, agricultural labourers by 1983; and

(c) 12.5 per cent of the total credit advanced to small scale industries should be reserved for artisans, village craftsmen and cottage industries.

Further, banks were exhorted to ensure that finance provided to agriculture and allied activities should reach a level of at least 15 per cent of the total credit by March, 1985 and 16 per cent of the total credit by March, 1987.

It was also stipulated that advances to weaker sections of the society, (which have been defined to cover small and marginal farmers, landless labourers, tenant farmers, share croppers, artisans, village and cottage industries, beneficiaries of the Integrated Rural Development Programme, Scheduled Castes and Scheduled Tribes and beneficiaries of differential rate of interest programme) should reach a level of 25 per cent of priority sector advances or 10 per cent of the total bank credit outstanding by March, 1985.

The central banking authority in India not only introduced mandatory stipulations for commercial banks in respect of deployment of credit to small enterprises, but also took several important measures to encourage and facilitate the attainment of these stipulated goals. These were in the form of various incentives such as (a) provision of refinance at concessionary rates of interest, (b) provision of guarantee cover, (c) formulation at the grass-roots level of area-specific credit plans for development of small enterprises in various sectors such as agriculture, small scale industries and small business, (d) provision of consultancy facilities and technical expertise to the banks for evolving suitable lending programmes, and (e) training of bank staff, etc.

In these efforts, the Reserve Bank of India took the support of the various developmental institutions like the IDBI, ARDC, NABARD, DICGC, etc., which it had actively helped to promote. In fact, the Reserve Bank of India brought about an orchestration of the policies of all these developmental institutions, so as to facilitate expansion of credit by commercial banks to small enterprises in various sectors of the economy and slowly and systematically helped overcome the hesitation on the part of the commercial banks to lend to these enterprises, with their weak economic base and poor entrepreneurial abilities.

Refinance facilities are being provided to the commercial banks by the Industrial Development Bank of India (IDBI) (for credit limits sanctioned to the small industries and small

business sectors) and the National Bank for Agriculture and Rural Development (NABARD) (for agricultural loans). Refinance helps the banks to have access to a relatively cheaper source of funds and enables them to extend loans of a volume much higher than that warranted by the resources otherwise available to them. Refinance facilities thus remove the constraint of resource-availability on credit extension. Lower rates of interest on refinance provide incentives to the banks, by making up for the reduced profitability or loss arising on the loans granted to weaker sections, at concessionary rates of interest.

IDBI provides refinance to commercial banks in respect of term loans sanctioned to small industries and transport operators. There are two schemes operating at present, viz., the Automatic Refinance Scheme and the Normal Refinance Scheme. The Automatic Refinance Scheme has been designed to facilitate easy access to the refinance merely by submitting a statement to the IDBI in case of the smaller loans upto Rs. 5,00,000. At the beginning of each year, IDBI allots limits of refinance that each commercial bank may draw, based on its loaning programmes. Refinance is provided at the rate of 9 to 11 per cent per annum and is made available to the extent of 80 to 100 per cent of the loans sanctioned. Between 1964 to 1985, IDBI had disbursed refinance to commercial banks to the extent of Rs. 47.9 billion, (4790 crores) while during the year 1984-85 refinance disbursed amounted to Rs. 9.6 billion (960 crores).

NABARD, the apex bank for agriculture and rural development, provides refinance to financial institutions financing the rural sectors (commercial and co-operative banks, land development banks and regional rural banks) engaged in financing various agricultural activities, viz., minor irrigation, electrification of pumpsets, farm mechanisation, dairy development, forestry|plantation development, dry land agriculture, inland fisheries, etc. The refinance provided to the institutions ranges from 50 per cent of the loans sanctioned (as in the case of farm mechanisation) to 90 per cent (e.g., for loans to small and marginal farmers). Refinance is made available at 6.5 per cent per annum interest rate, as against the prevailing Bank rate of 10 per cent per annum. As on June 1985, NABARD had disbursed refinance to the tune of Rs. 54.3 billion (5430 crores) (including refinance provided by the erstwhile ARDC).

Apart from IDBI and NABARD, the Export-Import Bank of India (EXIM Bank) also makes available refinance to banks who have met the financial requirements of exporting small industries by providing pre and post-shipment credit. As at the end of 1985, EXIM Bank had disbursed refinance to the extent of 640 million (Rs. 64 crores).

In order to encourage commercial banks to undertake financing of small enterprises, where the risk of failure of the business venture and of ultimate loss to the lender is relatively higher, the Reserve Bank of India and the Government thought it necessary to provide a mechanism for covering the additional risks to which commercial banks were exposed. For this purpose, initially two institutions were set up, Credit Guarantee Organisation (for small industries) by the Reserve Bank of India and Credit Guarantee Corporation by the Central Government (for other small loans).

Later, these institutions were merged with the Deposit Insurance Corporation to form the Deposit Insurance and Credit Guarantee Corporation (DICGE). It provides risk guarantee cover for all credit facilities granted to small borrowers. Guarantee cover is provided to the financing institutions to the extent of 60 to 90 per cent of the advances granted, upto a limit of Rs. 1 million in respect of individual units. The Corporation charges a nominal premium from the institutions for providing the guarantee cover and it is obligatory for the banks to avail of the guarantee cover in respect of all their small advances. As on June 1984, the guaranteed advances to small enterprises were Rs. 48.9 billion (4890 crores).

The counterpart of the DICGC for export credit is the Export Credit Guarantee Corporation of India Ltd., (ECGC) which issues guarantees to banks for export advances including those to small enterprises. The Corporation issues Packing Credit Guarantees, Post-shipment Export Credit Guarantees and Export Performance Guarantees.

After exhausting all available resources for recovery of bad debts, the banks submit claims to the DICGC|ECGC and their written-off losses are made good by these Corporations to the extent of risk-coverage (60% to 90% depending on the loan amount). The procedure for getting such claims is very simple for smaller loans.

Another measure taken by the Reserve Bank of India was the introduction of Lead Bank Scheme, under which 'Area Development Approach' was adopted taking the District as a unit (population average one million). Under the scheme, introduced in 1970, all the Districts were allotted to various banks to function as the Lead Bank. The Lead Bank as the leader of the consortium consisting of all banks in the area and the developmental agencies of the Government at the district level, has been undertaking following functions:

Opening of bank branches in deficit pockets in the rural and interior areas, so that banking facilities become available to the villages and small towns within approachable distances.

Preparation and implementation of District Credit Plans for channelling bank credit for small enterprises in the field of agriculture, small industries, artisans, small business, etc. For this purpose, area-specific schemes for small units are formulated after taking into account the local skills|resources available and the Government developmental programmes in operation. These area credit plans estimate the potential for lending available to banks under various economic activities, taking into account the local resources and skill-base, backward and forward linkages available and the development programmes of various governmental agencies.

Consultative Forums have been set up at Block (a block being a small administrative unit—one District on an average has 10-15 Blocks), District and Regional levels, consisting of representatives of commercial and co-operative banks, RBI, NABARD and Government agencies. These forums meet periodically to oversee and review implementation of the District Credit Plans.

The IDBI provides technical consultancy to entrepreneurs, through the Kerala Industrial Technical Consultancy Organisation set up with headquarters in Ernakulam. The KITCO renders industrial and technical guidance to entrepreneurs in the areas of project formulation, selection of plant and machinery, order placement, plant lay-out, start-up and trial production. In the agricultural sector, the NABARD formulates and also accords approval to area-specific credit schemes prepared by banks in respect of minor irrigation, animal husbandry, fisheries, pisiculture, sericulture, plantation crops, etc. The schemes approved by NABARD are implemented by the banks, with variations to suit local conditions.

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APPENDIX

Industrial Development Promotional Agencies

Sl. No.	Name of Agency	Location	Year of establishment	Functions
(1)	(2)	(3)	(4)	(5)
1	Small Industries Service Institute (S. I. S. I.)	Kerala Varma College Road, Trichur.	1955	Helps entrepreneurs in the identification of small scale industries, preparation of schemes, selection of suitable raw materials, machinery etc. Provides training facilities in machine shop practice, wood work, blue print reading, food processing and preservation and Industrial Management. There are also 4 Production Centres for strengthening and technological improvements—at Ettumanur in Kottayam District for simple machine tools and hand tools—at Thiruvalla in Pathanamthitta District for electric motors manufacture—at Muvattupuzha in Ernakulam for Tin Can manufacture—at Attingal in Trivandrum District for sheet metal works and utensils manufacture.
2	Kerala State Small Industries Development and Employment Corporation (SIDECO)	Trivandrum	1977	Provides pre-investment, investment and post investment consultancy service conducive to the promotion of small industries. Procures and distributes scarce raw materials. Subscribes to share capital of

				co-operative societies, private and public limited companies (small scale industries alone). Assists in providing loans for margin money to small scale industrialists, besides credit guarantee. Also under writes share of public limited companies engaged in small scale industries. Promotes Inter-State trade and export of SSI products.
3	Kerala Industrial and Technial Consultancy Organization Ltd.	Cochin		Identifies project ideas, prepares project and feasibility reports, conducts market surveys and assists in implementation of projects. Imparts training on various aspects of industry.
4	Kerala State Industrial Development Corporation	Trivandrum	1961	Preparation of project profiles, feasibility reports, project reports, obtaining letters of intent/Industrial licences for large and medium industries. Provision of financial assistance to large and medium industries by way of share capital, underwriting, loans or guarantees.
5	Kerala Financial Corporation	Trivandrum	1953	Provides medium and long term loans on easy terms, repayment ranging from 10-15 years for acquisition of land, construction of building, purchase and installation of plant and machinery, operates special scheme to provide assistance to technocrats. Makes available foreign exchange loans for the import of capital equipments from member countries of World Bank. Participating with Government of Kerala in the Massive Industrialisation Programme by extending special concessions to units established in Mini Industries Estates and also to entrepreneurs belonging to Scheduled Castes and Tribes.

(1)	(2)	(3)	(4)	(5)
6	Kerala State Electronics Development Corporation Ltd., Keltron.	Trivandrum	1973	Gives technical assistance for starting electronic units. Provides financial and marketing assistance for development of electronic industry.
7	Kerala State Bamboo Corporation Ltd.	Angamali	1971	Promotion of traditional Bamboo industry and the uplift and welfare of the workers. Distribution of raw materials and procurement and marketing of finished products.
8	Kerala Agro Industries Corporation Ltd.	Trivandrum	1968	A joint venture of the State and Central Government. Helps in procuring and supplying to the farmers modern agricultural machinery like tractors, power tillers, pumpsets, power sprayers etc. Free training is imparted to entrepreneurs engaged in servicing agricultural machinery.
9	Handicrafts Development Corporation of Kerala Ltd.	Trivandrum	1968	Promotes Inter State and export trade of handicraft products, supply of raw materials for handicraftsmen.
10	Kerala State Handicrafts Apex Society Limited.	Ernakulam	1964	Promotes marketing of handicraft products from Primary Co-operative Societies.
11	Kerala State Cashew Development Corporation.	Quilon	1970	Rehabilitation of a large number of workers mostly women thrown out of employment from the cashew industry, which faced a crisis during 1969-70. The Corporation represents nearly 25% of the industry and is the leading exporter of cashew kernels.

12	Special Officer, Cashew.	Quilon		Renewal, change and modification of licences for Cashew Factories.
13	Kerala State Development Corporation for Scheduled Castes and Scheduled Tribes Ltd.	Trichur	1972	Provision of loan for margin money to prospective entrepreneurs belonging to Scheduled Castes and Scheduled Tribes to set up industries reserved for them by the State Government in Mini Industrial Estates.
14	Kerala State Coir Corporation.	Alleppey	1969	Export house for coir products manufactured by small scale producers.
15	Director of Coir Development.	Trivandrum		Issue of Movement Permit for husks and fibre disposal permit for raw and retted husk and also for manufacture of coir fibre.
16	Kerala State Handloom Development Corporation.	Cannanore	1968	Procurement and distribution of yarn to weavers for weaving through the clusters and weavers Industrial Co-operative Societies organised by the Corporation.
17	Kerala State Handloom Weavers Co-operative Society.	Trivandrum	1961	Marketing of handloom goods produced in the Co-operative sector through sales depots and show rooms within and outside the State.
18	Regional Research Laboratory (RRL) C. S. I. R. Complex Poly technology Transfer Centre.	Industrial Estate, Pappanamcode, Trivandrum Kalamasserry Development Block.		Preparation of standards relating to products, commodities, materials and processes and the promotion of their general adoption at national and international levels. Certification of industrial products; assistance in production of quality goods. Dissemination of information relating to standardisation.

(1)	(2)	(3)	(4)	(5)
19	Industrial Development Bank of India (IDBI).	Cochin		Direct financial assistance to Industries. Refinancing of Industrial loans granted by Banks and other financial institutions. Rediscounting of Bills export finance.
20	Industrial Finance Corporation of India (IFCI)	Cochin*		Provides financial assistance to limited companies (private, joint and public), Co-operative Societies—Long term loans, underwriting of equity, preference, and debenture issues. Guarantee of deferred payments for machinery imported or purchased within India. Guarantee of loans raised in foreign currency from foreign financial institutions.
21	Industrial Credit and Investment Corporation of India (ICICI).	Bombay		Foreign currency loans for import of capital equipment Rupee assistance in the form of loans and guarantees. Underwriting of direct subscription to equity and preference shares and debentures.
22	Industries Department	Trivandrum		Responsible for sponsoring, promoting registering, financing, controlling and directing industries in the State. It guides prospective entrepreneurs in the selection of appropriate industries location, and machinery and promotes industrial ventures in private, public, joint and co-operative sectors. It recommend to the Government of India applications for letters of intent and industrial licences for projects in Kerala. The Department also keeps close and effective liaison with technical consultancy organisations, financial institutions and other industrial promotional agencies for the planned development of industries in the State.

*Branch at Cochin.

Small-Savings Scheme

The National Savings Scheme plays an important role in mobilising resources for the developmental activities, without causing undue hardship to the participants. It helps to inculcate the habit of thrift and savings among people and also to curb inflation to a certain extent. It is a national programme and the various issues are Central Government securities. The State Government's role is confined to publicity, propaganda and organization of special campaigns for ensuring maximum collections. ¾ of the net collection is given to the State Government as loan by the Government of India. The share received during 1984-85 was Rs. 13.33 crores. The following investment plans are in vogue:—

1. Post Office Savings Account.
2. Five Year Post Office Recurring Deposit Account.
3. Ten Year Post Office Cumulative Time Deposit Account.
4. Post Office Time Deposits.
5. Seven Year National Savings Certificate (II issue).
6. Six Year National Savings Certificate (VI issue).
7. Six Year National Savings Certificate (VII issue).
8. Ten Year Social Security Certificate.
9. Fifteen Year Public Provident Fund Scheme.

In 1984-85, these schemes netted an amount of Rs. 115.22 crores (gross) and Rs. 47.31 crores net. The collections are increasing annually.

Statement of gross and net collections during 1984-85

(Rs. in lakhs)

Category	*Gross Collection*	*Net Collection*
Post Office Savings Bank	4,964.25	254.99
Post Office Recurring Deposit	1,702.17	994.25
Post Office Cumulative Time Deposit	291.91	97.10
Post Office Time Deposit	1,367.83	403.25
National Savings Certificate	2,107.45	1,993.74
Public Provident Fund (Post Office)	9.73	9.01
Public Provident Fund (Banks)	78.64	78.64
Total	10,522.98	3,830.98
Non Exempted Establishment's Provident Fund Share	1,000.00	900.00

The National Savings Directorate is the Government Organisation, entrusted with the promotion of the National Savings Scheme in Kerala. The principal function of the Department is the organisation and conduct of publicity and propaganda to the various programmes under National Savings Scheme and mobilise maximum collection. There are different attractive investment plans, each designed to cater to the specific needs of the different types of small savers and investors including non-resident Indians. These deposits are safe and fully secured by the Government of India. Interest yields are higher than those offered by commercial banks for similar deposits. The concessions available under income tax and wealth tax are additional attractions.

State Lottery

Kerala, was a pioneer in setting up a State Lottery, which has proved to be an effective mobiliser of non-tax revenue to be utilised for developmental purposes. The State-run lottery commenced in 1967; and is being managed by a separate department. Since its inception, 239 lotteries (upto 1-4-1986) have been conducted at regular intervals of fifteen days duration, which are supplemented by special lotteries conducted during the festival season of *Vishu, Onam* and *Christmas*, where the prizes offered are substantially higher. During 1985-86, Rs. 7 lakhs was the first prize offered for the ordinary draws. For the *Vishu* Lottery, the first prize was Rs. 10 lakhs for the *Onam* Lottery, the first prize was Rs. 25 lakhs with an added attraction of one Ambassador Mark IV Car and the Christmas—New Year Lottery, the first prize was Rs. 25 lakhs. As a fund raising strategy lotteries have some distinct advantages. The voluntary character and thin spread of incidence together with the prospect of the participant winning a handsome prize seem to make it a painless method. The Kerala example has been followed by almost all the other State Governments.

The media used for publicity are the language newspapers published within the State, dailies with country wide circulation, besides language papers published from outside the State as well as several periodicals approved by the Director of Public Relations. Twenty-nine dailies within the State and 39 dailies outside the State are in the regular media list. In general the results of the draws of the lotteries are only given as advertisements. Display advertisements are released when

Bumper draws are launched. Multi-coloured wall posters are printed for display to ensure better publicity are also used. In the event of Special Bumper Lottery advertisement sudes are exhibited in cinema theatres in all Districts. The number draws are televised and shown to the gathering of public through closed circuit television of Keltron. Advertisements were also given to special issues of periodical publications, annual issues, souvenirs, children's and science magazines. The lottery tickets are sold through agents registered with the Department. The agents are allowed 20% commission at source of sales. Additional commission ranging from 2 to 5.25% are also given to agents according to different slab on off take of tickets. The cost of a ticket is Rs. 2 for ordinary draw and Rs. 3 for bumper draw. An Ambassador Car is offered as a special gift to the agent who purchases 7 lakh tickets and above of the *Onam* and Christmas Bumper Lottery, an Enfield Bullet Motor Cycle is gifted to agents whose purchase range from 3 to 7 lakh tickets. The sellers are also allowed 2% commission on drawn out prize tickets on production of sellers counterfoil. During 1985-86, Rs. 2.51 crores was paid as Commission. The income from sale of tickets during 1985-86, was Rs. 12.57 crores. In all the total revenue earned from the 239 lotteries amounted to Rs. 77.02 crores—a substantial sum.

The State Lotteries Department has also adopted a unique and commendable method to detect forgery among disputed raffle tickets. The Rubber Stamp is affixed (while selling) to cover both the ticket and the counterfoil and the Government agency will retain the latter. A comparison of the stamps will show the genuineness or otherwise of the tickets whenever doubts arise. The imprints are bound to differ on each ticket according to the force applied when franking. Thus the possibility of spurious or counterfeit tickets claiming prizes is eliminated.

Apart from enabling the Government to finance development programmes, the lotteries help thousands of people to earn a living through sale of tickets. The number of agents registered with the lotteries department upto 31-3-1986 is 9,934.

In February 1987 the Government decided to convert the State Lottery into a weekly lottery carrying a large number of prizes. Accordingly, draws will be held on the fifth, twelfth, twentieth and twenty-seventh of every month. The draw on fifth would be a mini bumper raffle offering an ambassador car and Rs. 10 lakhs as the first prize.

For the first time after the formation of the lottery scheme in 1967, the total number of prizes to be distributed every month will be as high as 14 lakhs carrying a total amount of Rs. 1.25 crores plus the ambassador car. The price of tickets will be Rs. 5 each for both the number and the ordinary lottery.

The tickets for the mini-bumper lottery would be on sale for 15 days before the draw. The other prizes for it will include a second prize of Rs. 1 lakh and consolation prizes of Rs. 500 each for tickets with the same number as the first prize winning ticket but of different series. There will also be 84 prizes of Rs. 2,000 each, 105 prizes of Rs. 100 each, 2,097 prizes of Rs. 10 each and 21,000 prizes of Rs. 5 each. This means that there would be a prize for every five tickets.

The ordinary lottery withdrawns on the twelfth, twentieth and twenty-seventh will have Rs. 9 lakhs as the first prize. There will be three second prizes of Rs. 25,000 each and six third prizes of Rs. 5,000 each. Besides there will be 75 fourth prizes of Rs. 1,000 each, 1,497 fifth prizes of Rs. 100 each, 15,000 sixth prizes of Rs. 10 each and 3,00,000 seventh prizes of Rs. 5 each.

Consolation prizes of Rs. 5,000 each are offered to tickets with the same number as the first prize winning ticket but of a different series.

The agents for the lotteries would get an advance Commission of 20 per cent. The Commission would be calculated at 25 per cent, if the agent purchased 500 tickets or more. The bonus for the agents will be five per cent instead of two per cent at present.

They would also get five per cent of all prizes above Rs. 100 won by the tickets sold by them The agent, purchasing the highest number of tickets, would get a prize of Rs. 2,000. There would also be three other prizes of Rs. 1,000, Rs. 500 and Rs. 250 for agents in the purchase of tickets. These three prizes would be separately awarded for agents from inside and outside the State. The agents selling the highest number of tickets in the districts would get Rs. 200 each.

Currency and Coinage

The princely States of Travancore and Cochin had independent coinage of their own. The coinage in Travancore comprised of *Sirkar* Rupee, *Chuckram,* and *Kasu.* The Sirkar rupee as such was not actually minted, but the Sirkar half rupee and quarter rupee both silver coins were in circulation.

The *Chuckram* and *Kasu* were copper coins; 28 *Chuckrams* being equivalent to one rupee. The conspicuous feature of the *Kasu* as far as its value and size was concerned was its microscopic value. Indeed it could have been the world's smallest coin. 28½ of them made up one anna and 456 Kasu—a British rupee.

In the Cochin State gold coins called *Puthens* were minted. These ceased to be legal tender in 1900.

With the integration of the States of Travancore and Cochin, in April 1950, these coins, ceased to be legal tender, By 1953, they had virtually gone out of circulation. The coinage prevalent in what was known as British India was the Rupee, anna and pie system, the ultimate division was into one hundred and ninety two—with the rupee being divided 16 annas and the anna being divided into 12 pies. With the introduction of metrication in April, 1957, came the clean, easy division of the Rupee into one hundred parts the unit being called naya paisa and later just paisa. Later in 1984, the Government of India decided to abolish the one paise and two paise coins as the minting of such coins was no longer profitable.

Trade and Commerce

Duarte Barbosa in the early sixteenth century wrote of Malabar, perhaps with some exaggeration, "everything is produced in every month of the year". The Book of Duarte Barbosa (II. 90) *

(a) *Course of trade: imports and exports.*—The course of trade comprises of the volume of external and internal trade. The external trade relates to the export and the import trade handled through the port of Cochin, and the air cargo complex at Trivandrum. Kerala commands a sizeable share of the country's exports; the bulk of which is through the Cochin Port. The exports consist of mainly marine products, coir and coir products, spices, cashewnuts, tea, coffee and rubber. The details of the trading activities of the port and the commodities handled are given below.

With its strategic location on the South-West Coast of India and its unique position on the East-West trade route, Cochin Port is the natural gateway to the vast industrial

* An account of the countries bordering on the Indian Ocean and their inhabitants,—trans: Longworth Dames 2 Vols. London 1918 and 1921.

complex and the produce market of South India. This is further enhanced by the fact that the port is the focal point for trade and traffic by rail, road, waterways and air. It provides a firm infrastructure for the sustained economic growth and development of Southern India. Its hinterland includes Kerala, South-West portion of Karnataka and Tamil Nadu which together form a contiguous traffic area for its imports and exports. In 1902-1903, the total value of the exports and imports of Cochin Port was Rs. 3.03 crores; it was Rs. 158 crores in 1960-61; and in 1984-85 it stood at Rs. 1431 crores (inclusive of coastal trade). Likewise the volume of trade handled was 7.7 lakh tonnes in 1940-41, and 52.66 lakh tonnes in 1980-81. The exports through Cochin include many items fetching valued dollars and yens, such as tea, coffee, rubber, cashews, spices, marine products, refined petroleum products, timber etc., while major item of imports include crude petroleum, food grains, fertilizer—both raw material and finished cement, raw cashewnuts, machinery and hardware, newsprint and staple fibre, zinc concentrates, bauxites, iron and steel. The export activities of the port are detailed below.

During 1984-85, total exports through Cochin Port stood at 3.98 lakh tonnes as against 9.02 lakh tonnes in 1983-84. The total exports recorded a fall of 55.9 per cent. The coastal exports from Cochin Port during 1984-85 registered a fall of 86.2 per cent compared to that in the previous year. This was mainly on account of the fall in the export of refined petroleum products to Indian coastal ports as a result of the closure of the Cochin Refinery for a long period in connection with its expansion programme during 1984-85. Repairs to the Refinery caused by the fire hazard in the Refinery in March 1984 prolonged the shut down.

In 1985-86, the total exports improved to 7.19 lakh tonnes due to a substantial increase in the coastal traffic mainly due to import of crude oil from Bombay High.

TABLE I

Exports through Cochin Port

Year	*Coastal*		*Foreign*		*Total*	
	Quantity (lakh tonnes)	*Value (Rs. crores)*	*Quantity (lakh tonnes)*	*Value (Rs. crores)*	*Quantity (lakh tonnes)*	*Value (Rs. crores)*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1982-83	5.26	29.65	7.13	669.11	12.39	698.76
1983-84	4.77	24.90	4.25	660.95	9.02	685.85
1984-85	0.66	13.20	3.32	870.05	3.98	883.25
1985-86	2.21	40.33	4.98	837.32	7.19	877.65

Source: Cohcin Port Trust.

TABLE II

Commodity-wise Exports through Cochin Port

Item	1984-85		1985-86	
	Quantity (Tonnes)	*Percentage to total*	*Quantity (Tonnes)*	*Percentage to total*
(1)	(2)	(3)	(4)	(5)
Tea	57,585	14.5	26,178	3.6
Cashew Kernels	35,776	9.0	36,391	5.1
Sea Foods	37,413	9.4	34,947	4.9
Coir Products	27,083	6.8	25,795	3.6
Spices	32,625	8.2	44,491	6.2
Coffee	33,477	8.4	46,456	6.4
Miscellaneous	173,750	43.7	504,940	70.2
Total	397,709	100.0	1,019,198	100.0

Source: Cochin Port Trust.

TABLE III

Commodity-wise Distribution of Exports through Cochin Port during 1984-85 and 1985-86

(Tonnes)

Sl. No.	Commodities	1984-85 Coastal	1984-85 Foreign	1984-85 Total	1985-86 Coastal	1985-86 Foreign	1985-86 Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Coir Products	..	27,083	27,083	..	25,795	25,795
2	Tea	..	57,585	57,585	..	26,178	26,178
3	Rubber and Rubber Products	..	44	44	..	1,246	1,246
4	Coffee	..	33,477	33,477	..	46,456	46,456
5	Coconuts	..	..	..	..	..	..
6	Copra	..	..	..	..	..	..
7	Cashew Kernels	..	35,776	35,776	..	36,391	36,391
8	Chemicals	30	5,671	5,701	..	6,923	6,923
9	Cotton raw & waste	.	3,183	3,183	..	90	90
10	Cotton piece goods	..	..	..	..	13,020	13,020
11	Rice and other foodgrains	1,648	..	1,648	150	..	150
12	Pepper	..	25,023	25,023	..	36,388	36,388
13	Ginger	..	4,741	4,741	..	5,458	5,458
14	Cardamom	..	710	710	..	817	817
15	Cashew shell liquid	..	3,493	3,493	..	1,633	1,633
16	Turmeric	.	2,151	2,151	..	1,827	1,827
17	Coconut oil	..	..	..	..	..	..
18	Lemongrass oil	1	226	227	..	12	12
19	Timber	106	2,334	2,440	42	2,262	2,304
20	Marine Products	..	37,413	37,413	..	34,947	34,947
21	Oil cakes	..	..	..	..	..	..
22	Machinery	389	2,690	3,079	57	1,842	1,899
23	Iron and Steel	22	1,350	1,372	7	1,382	1,382
24	Mineral sand including granite	..	6,306	6,306	..	5,569	5,569
25	Cement	4,150	..	4,150	1,635	..	1,635
26	Transhipment cargo	..	552	552	..	..	..
27	Miscellaneous	59,856	81,699	141,555	219,659	249,412	469,071
	Total	66,202	331,507	397,709	221,550	497,648	719,198

TABLE IV

Value of exports and imports through Cochin Port

(*Rs. Crores*)

Item	*Year*		
	1983-84	1984-85	1985-86
Foreign Exports	660.95	870.05	837.32
Coastal Exports	24.90	13.20	40.33
Total Exports	685.85	883.25	877.65
Foreign Imports	561.73	367.95	503.32
Coastal Imports	177.84	180.21	297.69
Total Imports	739.57	548.16	801.01
Total Trade	1,425.42	1,431.41	1,680.66

Source: Cochin Port Trust.

Marine Products

During 1985-86 India exported 83,651 tonnes of marine products valued at Rs. 398 crores as against 86,187 tonnes valued at Rs. 384.29 crores in 1984-85. The growth achieved in value terms during 1985-86 was marginally higher at 3.6 per cent compared to 3.02 per cent recorded in the previous year. Table gives the details of exports of marine products from India and Kerala for the last 6 years. Kerala's share in India's total export of marine products was significant. The share of Kerala was 35.36 per cent of India's exports and 34.69 per cent in terms of value.

TABLE V

Export of Marine Products from Kerala and India

	Kerala		*India*		*Kerala's share*	
Year	*Q*	*V*	*Q*	*V*	*Q%*	*V%*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1980-81	29,148	9,534	75,591	23,484	38.56	40.60
1981-82	32,006	12,512	70,105	28,601	45.65	43.75
1982-83	32,525	14,147	78,175	36,136	41.6	39.15
1983-84	32,840	14,086	92,691	37,302	35.43	37.76
1984-85	31,570	14,873	86,187	38,429	36.63	38.70
1985-86	29,580	13,808	83,651	39.800	35.36	34.69

Q--Quantity in Tonnes. V--Value in Rs. lakhs.

Source: Marine Products Export Development Authority.

Frozen shrimp continued to dominate the export trade during 1985-86. The share of frozen shrimp in exports has slumped marginally from 64 per cent in 1984-85 to about 60 per cent in 1985-86 in terms of quantity and from about 86 per cent to 83 per cent in terms of value. During the year export of frozen cuttle fish and squids went up both in terms of quantity and value. Exports of canned as well as dried item suffered a set-back during 1985-86. Out of the marine products exported from Kerala, frozen shrimp is the most important item followed by frozen cuttle fish, fillets, frozen squids, frozen frog legs, frozen lobster tail and frozen clams.

TABLE VI

Item-wise Exports of Marine products through the ports of Kerala

Item	1984-85		1985-86	
	Quantity (Tonnes)	Value (Rs. lakhs)	Quantity (Tonnes)	Value (Rs. lakhs)
Frozen Shrimps	26,589	13,415.07	22,721	11,969.73
Frozen frog legs	1,270	350.91	1,099	480.81
Frozen lobster tails	496	361.73	394	350.74
Frozen cuttle fish/fillets	1,064	339.55	2,611	631.97
Frozen squids	727	117.48	1,859	232.52
Frozen clams	881	122.15	384	61.22
Canned shrimp	29	20.49	12	6.05
Frozen fish	216	26.87	384	30.16
Fish oil	207	15.92	..	..
Dried fish	5	1.51	7	1.09
Others	89	41.76	109	43.36
Total	31,573	14,813.44	29,580	13,807.65

Source: Marine Products Exports Development Authority

Coir and Coir Products

Coir occupies a very important place in the industrial map of Kerala. Over 98 per cent of the total export of coir items from India belong to Kerala. The main items of coir exported are coir yarn, coir mats, coir mattings, rugs and carpets. Small quantities of coir fibre, coir rope, coir products of other sorts like tea leaf bags, birds nest and items like curled coir are also exported from Kerala.

Export of coir and coir products from India amounted to 24,672 tonnes valued at Rs. 32.85 crores during the year 1985-86. The quantity of export was 25,788 tonnes valued at Rs. 26.41 crores during the previous year. This shows there was

a decline of 1,116 tonnes (4 per cent) in quantity and an increase of the 6.44 crores (24 per cent) in value. Export of coir yarn from India in the year 1985-86 was 13,398 tonnes valued at Rs. 15.30 crores from 12,775 tonnes valued at Rs. 9.84 crores during 1984-85. Export of coir mats from India amounted to 7,433 tonnes valued at Rs. 11.18 crores during the year under review as against 7,756 tonnes valued at Rs. 9.45 crores during the previous year. The main importers of coir and coir products from India are Netherlands, Federal Republic of Germany, France, Italy, U.S.A., Portugal, Saudi Arabia, Poland, Belgium, Denmark, U. K., Australia, Canada, Greece and U.S.S.R. The entire quantity of coir mattings, rugs and carpets exported from India was through the ports of Kerala.

TABLE VII

Item-wise Export of Coir and Coir Goods from Kerala and India 1985-86

Item	*Kerala*		*India*		*Kerala's share*	
	Quantity (Tonnes)	*Value (Rs. lakhs)*	*Quantity (Tonnes)*	*Value (Rs. lakhs)*	*Quantity (%)*	*Value (%)*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coir Yarn	13,354	1,515.66	13,398	1,519.62	99.67	99.74
Coir Mats	7,397	1,112.16	7,433	1,118.20	99.52	99.46
Coir Matting	3,298	558.29	3,299	558.62	99.97	99.94
Coir Rugs & Carpets	465	77.39	465	77.39	100.00	100.00
Coir (Other sorts)	15	2.50	15	2.50	100.00	100.00
Coir Rope	44	5.68	53	6.74	83.02	84.27
Rubberised Coir goods	9	1.60	9	1.60	100.00	100.00
Total	24,582	3,273.28	24,672	3,284.67	99.64	99.65

Source: Coir Board.

Spices

India exported spices to the countries in Western and Eastern Europe, America, Middle East Zone and East Asia. The main items of spices exported pepper, ginger, cardamom, chillies, turmeric, coriander, curry powder, oils and oleoresins of spices had shown steady increase since 1982-83. The export earnings from spices attained a new peak of Rs. 282.52 crores in 1985-86 as against Rs. 209.02 in 1984-85.

TABLE VIII

Export of Spices from India

Item	1982-83 *Value* *(Rs. lakhs)*	1983-84 *Value* *(Rs. lakhs)*	1984-85 *Value* *(Rs. lakhs)*	1985-86 *Value* *(Rs. lakhs)*
Pepper	2,938.70	4,134.70	6,054.37	17,248.47
Cardamom	1,674.36	603.34	6,597.06	5,527.05
Chillies	1,235.44	878.27	966.54	202.03
Ginger	588.49	1,190.16	1,872.76	1,089.35
Turmeric	423.54	1,105.50	1,715.70	1,209.44
Curry Powder	336.08	317.24	389.67	366.36
Coriander	445.94	595.01	398.57	160.06
Cumin	311.00	696.86	537.76	165.70
Others	1,331.86	1,645.14	2,369.81	2,283.60
Total	9,285.41	11,166.22	20,902.24	28,252.08

Source: Spices Export Promotion Council.

Pepper

Pepper is the most important among the spices exported by India. India exported 37,629 tonnes of pepper valued at Rs. 172.48 crores during 1985-86. The export during 1984-85 was 25,426.5 tonnes valued at Rs. 60.54 crores. This shows there was an increase of Rs. 91.94 crores (184.90 per cent) in terms of value and an increase of 12,299.49 tonnes (47.95 per cent) in terms of quantity. Kerala exported 36,358

tonnes of pepper worth Rs. 150.44 crores through Cochin and Calicut Port. The share of Kerala in the export of pepper works out to 96.7 per cent in terms of quantity and 87.2 per cent of the value.

TABLE IX

Export of pepper from Kerala and India

	Kerala		India	
	Quantity (Tonnes)	*Value (Rs. crores)*	*Quantity (Tonnes)*	*Value (Rs. crores)*
1982-83	21,009	28.10	22,591.77	29.39
1983-84	25,389	37.10	25,787.29	41.35
1984-85	23,012	54 76	25,426.54	60.54
1985-86	36,388	150 44	37,619.62	172.48

Source: Spices Export Promotion Council.

Cardamom

Cardamom is one of the important export oriented plantation crops in India, grown in the evergreen forests of the three southern States of Kerala, Karnataka and Tamil Nadu. On an average Kerala contributes about 70 per cent of the national production and 92 per cent of the total export of cardamom. As a result of the favourable climatic conditions prevailing in the cardamom growing tracts coupled with the effects of the developmental schemes of the Cardamom Board, the total production increased. India exported 3,272 M.T. of cardamom valued at Rs. 53.41 crores in 1985-86 as against 2,383 M.T. valued at Rs. 64.81 crores in 1984-85. The export earnings in 1984-85 is an all time record in the history of cardamom industry. The share of Kerala has increased to 91 per cent both in quantity and value during 1984-85 from 75 per cent during the previous year. But in 1985-86 the export earnings registered a significant decline.

TABLE X

Export of Cardamom from India and Kerala (1981-1986)

Year	Estimated Export from Kerala		Total Export from India		Percentages share of Kerala in terms of	
	Quantity (M.T.)	Value (Rs. Crores)	Quantity (M.T.)	Value (Rs. Crores)	Quantity	Earnings
1980-81	2,015	30.35	2.345	34 75	86	87
1981-82	1,980	26.17	2,325	30.20	85	87
1982-83	844	13.75	1,032	16.37	82	84
1983-84	194	4.10	258	5.44	75	75
1984-85	2,170	59 05	2,383	64.81	91	91
1985-86	2,994	49.20	3,272	53.46	92	90

Source: Cardamom Board.

Ginger

Kerala is the largest producer of dry ginger in India accounting for about 60 per cent of the total production. During 1985-86 India exported 6,816 tonnes of ginger valued at Rs. 10.89 crores as against 7,329 tonnes valued at Rs. 18.73 crores during the previous year Kerala share in the total export of ginger in terms of quantity was 80 per cent in 1985-86 and the share of value 72 per cent.

TABLE XI

Export of Ginger from Kerala and India 1982-86

Year	Kerala*		India**	
	Quantity (Tonnes)	Value (Rs. Crores)	Quantity (Tonnes)	Value (Rs. Crores)
1982-83	3,063	4 08	3,954.71	5.88
1983-84	3,463	8.40	4,628.95	11.90
1984-85	4,741	11.06	7,328 92	18.73
1985-86	5,458	7.86	6,817.00	10.89

Source: *Cochin Port Trust.
**Spices Export Promotion Council.

Turmeric

India exported 8,562 tonnes of turmeric worth Rs. 12.09 crores in 1985-86 as against 12,801 tonnes of turmeric worth Rs. 17.16 crores in 1984-85. This shows a decline in production.

TABLE XII

Export of Turmeric from Kerala and India 1982-1986

Year	Kerala		India	
	Quantity (Tonnes)	*Value (Rs. lakhs)*	*Quantity (Tonnes)*	*Value (Rs. lakhs)*
1982-83	1,877	N.A.	7,594.76	423.54
1983-84	1,301	N.A.	10,891.88	1,105.50
1984-85	2,227.8	359.64	12,922.88	1,715.70
1985-86	2,085.26	501.02	8,561.74	1,209.44

Source: Spices Export Promotion Council.

Tea

India tops the world as the largest producer and exporter of tea. The year 1984-85 witnessed an all time high export earnings from tea whereas the year 1985-86 shows a declining trend in quantity and price. India exported 222,923 tonnes of tea worth Rs. 674.25 crores in 1985-86 as against 217,401 tonnes worth Rs. 717.39 crores in 1984-85. In 1985-86, Kerala exported 26,178 tonnes of tea; the export earnings from tea amounted to Rs. 53.57 crores as against 57,585 tonnes worth Rs. 150.12 crores in 1984-85. Both the quantity as well as value decreased by 54.54 per cent and 64.32 per cent respectively, over those of the previous year. This is probably due to the diversion of a sizeable chunk of exports from Cochin port to Tuticorin port and the emergence of Coimbatore as a tea auction centre which by virtue of being a cost effective business centre succeeded in siphoning off the volume of business of the tea trading houses in Cochin.

TABLE XIII

Export of Tea from Kerala and India 1982-86

Year	*KERALA**		*INDIA***	
	Quantity (Tonnes)	*Value (Rs. Crores)*	*Quantity (Tonnes)*	*Value (Rs. Crores)*
1982-83	41,138	60.99	194,090	369.44
1983-84	37,067	83.16	202,310	557.56
1984-85	57,585	150.12	217,401	717.39
1985-86	26,178	53.57	222,923	674.25

Source: *Cochin Port Trust.
**Tea Board.

Coffee

During the year 1985-86, the export of coffee from India was 99,298 tonnes valued at Rs. 274.98 crores. During the year 46,373 tonnes of coffee valued at Rs. 128.42 crores were exported through Cochin Port. The quantity of coffee exported through Cochin port showed an increase of 18,590 tonnes in 1985-86 compared to the previous year and the value showed an increase of Rs. 43.86 crores.

TABLE XIV

Export of Coffee from Kerala and India 1982-86

Year	*Kerala*		*India*	
	Quantity (Tonnes)	*Value (Rs. crores)*	*Quantity (Tonnes)*	*Value (Rs. Crores)*
1982-83	31,415	76.28	83,824	203.54
1983-84	28,099	69.10	71,179	175.05
1984-85	27,783	84.56	68,896	209.69
1985-86	46,379	128.42	99,298	274.98

Source: Coffee Board.

Cashew Kernel

During 1985-86, exports of cashew kernel from India amounted to 35,153 M.T. valued at Rs. 215.27 crores. In 1984-85 the quantity exported was 32,439 M. T. valued at Rs. 180.54 crores. The quantity and value of export registered an increase. During the year 1985-86 exports of cashew kernel from Kerala amounted to 31,904 tonnes as against 31,409 tonnes in 1984-85. The export earnings realised were worth Rs. 196.16 crores. Kerala accounted for about 92 per cent of India's total export of cashew kernels during 1985-86.

TABLE XV

Export of Cashew Kernel 1982-86

Year	*Kerala*		*India*	
	Quantity (Tonnes)	*Value (Rs. Crores)*	*Quantity (Tonnes)*	*Value (Rs. Crores)*
1982-83	28,075	122.44	30,195	132,28
1983-84	35,245	144.08	36,196	148,28
1984-85	31,409	174.47	32,407	180.54
1985-86	31,904	196.16	35,153	215.27

Source: Cashew Export Promotion Council.

Cashewnut Shell Liquid

India exported 2,180 tonnes of cashew shell liquid valued at Rs. 1.25 crores in 1985-86 against 3,411 tonnes valued at Rs. 1.81 crores in 1984-85. There was a decline both in quantity and in value of cashew shell liquid exported from India. This was due to the strong competition from Brazil. Kerala exported 1,574 tonnes of cashew shell liquid worth Rs. 0.83 crores during 1985-86 as against 2,662 tonnes valued at Rs. 1.13 crores in 1984-85. Table gives details of exports of cashew shell liquid from India and Kerala for the last 4 years.

TABLE XVI

Export of Cashew Shell Liquid 1982-86

Year	*Kerala*		*India*	
	Quantity (Tonnes)	*Value (Rs. Crores)*	*Quantity (Tonnes)*	*Value (Rs. Crores)*
1982-83	4,260	1.15	5,903	1.74
1983-84	1,446	0.55	3,385	1.36
1984-85	2,662	1.13	3,411	1.81
1985-86	1,574	0.83	2,180	1.25

Source: Cashew Export Promotion Council.

Import of Raw Cashew

Cashew Industry in India depends largely on imported raw nuts. During 1985-86, import of raw cashew nuts amounted to 23,310 tonnes worth Rs. 25.88 crores. The quantity and value registered a decline of about 29 per cent compared to the previous year. The quantity of raw cashew nuts imported through Cochin Port stood at 7,635 tonnes valued at Rs. 8.16 crores in 1985-86. The quantity as well as value showed a decline of 24.5 per cent and 32.7 per cent respectively when compared to that of the previous year. The table gives the details of the import of raw cashew nuts to Kerala|India.

TABLE XVII

Import of Raw Cashew Nuts—Kerala/India

Year	*Kerala (Through Cochin Port)*		*India*	
	Quantity (Tonnes)	*Value (Rs. Crores)*	*Quantity (Tonnes)*	*Value (Rs. Crores)*
1982-83	395	0.38	896	0.77
1983-84	16,796	13.77	21,877	22.12
1984-85	10,115	12.13	33,215	36.49
1985-86	7,635	8.16	23,310	25.88

Source.—Cashew Export Promotion Council.

TABLE XVIII

Net Foreign Exchange Earnings through Cashew Trade (Kerala) (1980-86)

Year	*Export Value* (*Rs. Crores*)	*Import Value* (*Rs. Crores*)	*Net earnings* (*Rs. Crores*)
1980-81	116.52	19.57	96.95
1981-82	143.86	17.36	126.49
1982-83	123.59	0.39	123.20
1983-84	144.61	13.77	130.84
1984-85	175.44	12.13	163.31
1985-86	196.99	8.16	188.83

Source: Cashew Export Promotion Council.

Whilst the composition of this trade has largely withstood significant change, the mode of handling of its cargo has been subject to vast and fundamental changes. The type and methods of storage of cargo in the old conventional ships steadily changed and several forms of unitization came into being--preslinging, pelletisation, etc.,—mainly aimed at expediting turn round of ships in ports and reducing damage to cargo in the course of handling. Then emerged the era of containerisation—what can be termed as the most revolutionary method of the carriage of cargo in international trade. It marched forward with stunning speed particularly in developed countries because the various advantages of containerisation became more and more clear, including the hitherto unknown facility of multi modal transport. Otherwise on innocent looking box made of steel could not have led to such a fundamental revolution in the art and science of transport by sea—and that too so quickly. Containerisation has replaced a conventional and fragmented transport system by one fully integrated method and it is the most vital contribution towards economy in international trade. In fact all round economy and maximum security constitute the bed rock of the concept of containerisation. Thus the *sine qua non* of a port in modern times is its capacity and ability to cope with the demands of containerised traffic.

The trade circles and port authorities concur on the utility of containerisation. Despite the obvious handicaps relating to handling equipment, the total tonnage of containerised cargo handled during 1982-83 recorded a further increase by 11.5% from 1.47 lakh tonnes in 1981-82 to 1.64 lakh tonnes. Total exports in containers significantly increased by 14.7%. Containerised exports were of cashew kernels, fish, coffee, chemicals, spices, coir products, tea and miscellaneous items. The number of containers handled (during 1982-83) was 31.130 including 13,846 empties. Many shipping lines operate regular container services to Cochin and empty containers themselves have become an export commodity since the public sector Balmer Lawrie Unit at nearby Aroor manufactures containers for export. During 1982-83, containers numbering 209 were exported to the Russian Port of Odessa.

An ambitious Container Terminal Project has been launched. The Port administration has proposed Rs. 70 crore development plan during 1985-90 which involves the strengthening of infrastructural facilities, replacement of cargo handling equipment and floating craft as also navigational aids, conversion of Quay 9 into a full fledged container berth and acquisition of containers and container handling equipment like gantry crane and transfer crane. 140 hectares of land contiguous to the Vallarpadom island is being reclaimed for development as a transhipment container complex for the fast growing East Asian trade. The strategic location of the port on the international trade is a plus point as is substantiated by Leoyds list of December 3, 1981, which emphasised how well Cochin is placed on the trading arteries of the World. Cochin on the main sea route between U.K. and the Far East is in a strong position to play a leading role in feeding the international container services that ply this route and act as transit terminal when facilities are fully developed.

Internal Container Depots (I.C.D.) linked with Cochin have been set up at Coimbatore, Bangalore and Quilon. The movement of stuffed containers, caters the long felt need of exporters of this region, by facilitating direct movement of exports from the place of manufacture to the port. Fruit products, processed fruit, *agarbathies* (scented joss sticks) electronic goods, waste paper were exported from the Bangalore Depot and cashew and marine products from the Quilon Depot.

Export Processing Zone (EPZ)

The scheme of 100 per cent Export-oriented Units (EOUs) has been formulatd by the Government of India in response to persistent demand from the exporting community that the special facilities as allowed to units situated in the two Free Trade Zones, namely, Kandla Free Trade Zone and Santacruz Electronic Export Processing Zone, should be extended to other manufacturing units located elsewhere. According to this scheme, a 100 per cent Export Oriented Unit is one which would export its entire production except for the permitted levels of rejects. To enable such units to meet the rigours of international competition in terms of price, quality and delivery the Government of India has decided to give them certain special incentives and facilities such as duty-free import of capital goods (new or old), raw materials and components, spares, consumables, jigs and fixtures, diesel generating sets under Open General Licences and to allow purchase of indigenous capital goods, raw materials, components and spares which go into the production of final product for export without payment of local excise duty and other taxes.

An Export Processing Zone is proposed to be set up in Cochin subject to the site being approved by a Board of Authority constituted by the Government of India. Over 900 acres at Thrikkakara has been identified as project area for the specific purpose of setting up the FTZ as well as other industrial activities. Among the facilities available for units established in the Free Trade Zones are the full re-imbursement of Central Sales Tax paid on purchase of goods from other States, uninterrupted power supply, a tax holiday for a period of five years, exemption of finished products and specified raw materials from levy of Central Excise; and freedom to import raw materials from domestic tariff areas without liability to pay any fiscal levies. The State Government is also considering 10 per cent investment subsidy on capital investment in the FTZ.

More than 100 items (including roasted and salted cashew in consumer packs) under different product groups viz., electronics, readymade garments, tea, coffee, spices, cashew, glass products, wood based items, processed fruits, frozen meat products, leather manufactures, rubber products, coir based items, gems and jewellery, sports goods, printing, domestic electrical appliances, handtools and building's hardware, bicycles and components, automobile parts, tapioca-based items, china clay products etc., will be promoted in the Zone.

The Cochin Export Processing Zone has given approval for the first of the units to be set up in the Zone—a project for manufacturing nylon fish nets.

The nylon fish net unit has a projected investment of Rs. 1.51 crores with an average annual export of Rs. 1.57 crores through buy-back arrangements. The unit requires about 75 cents of developed plot, and when production starts employment for about 80 persons is envisaged.

The scheme of export houses formulated by the Government of India is an important part in the structure of export assistance measures. Under this scheme eligible exporters with required minimum export performance are granted recognition as export houses to enable them to strengthen their negotiating capacity in foreign trade, to build up more enduring relationship between them and their supporting manufacturers and to develop new products and new markets for export particularly from the small scale and cottage industries sector. These export houses are provided with additional facilities for import of raw materials, components, spares, capital equipment and machinery and also additional allocations of foreign exchange for export promotional activities. The export houses are also eligible for claiming financial assistance from Market Development Fund (MDF) for expenditure on export promotion activities like participation in trade fairs, product development, brand publicity and sponsoring of delegation, etc. Out of the total of 1,683 export houses listed on the Federation of Indian Export Organization (FIEO) membership roster, 28 are from Kerala.

To promote further growth of exports from the non-traditional sector, a high level body—the Export Trade Development Council has been set up to act as the main agency for export promotion. The objects of this council are to review the State's export performance, to suggest development of new items and to recommend programmes and policies aiming at achieving export expansion.

Inland Waterways

The inland waterways of Kerala connect several minor ports with the major port of Cochin, and a number of industrial units are situated in proximity. The canal system navigable

throughout the year extends from Trivandrum in the south to Badagara in the north and is interlinked by backwaters and rivers through artificial canals. The inland water transport has withstood the competition from road and rail on account of its suitablity for moving certain types of cargo over long distances, economy in the use of energy and its low cost. Boats of varying capacities and sizes ply along the waterways for transport of goods of all descriptions not only for short distances locally but also to the several ports linking up the important commercial and industrial centres. Manufactured goods, tiles, coir, cement, timber and agricultural produce like copra, coconut, rice, etc., are mostly transported along these water routes. Water transport operations in the State are carried out by the State Water Transport Department and Kerala Inland Navigation Corporation. The operations of the former are concentrated in the Districts of Ernakulam, Kottayam, Alleppey and Quilon. The Department operated 69 routes covering a route distance of 7,540 km. (in 1984-85) and handled a cargo volume of 7,200 tonnes. The main activities of the Kerala Inland Navigation Corporation are transportation of raw materials for FACT Cochin Division and conducting ferry services to and from the Islands and Cochin. During 1984-85 the Corporation transported 1.25 lakhs tonnes of cargo and earned an income of Rs. 35.95 lakhs.

The details of import and export tonnage of cargo handled and revenue collected at the intermediate and minor ports of Kerala are given below: (Statement next page)

Trade by Road, Rail and Air

A substantial portion of goods in the State is by road. Unfortunately no reliable data exists regarding the goods traffic by road. Goods traffic by road is not confined to movement of goods within the State. Information on Inter State movement of goods by road is of vital importance in the context of drawing up programmes of economic development and also in relation to commodity taxation. A study conducted in 12 border checkposts of the State (by the Directorate of Economics and Statistics in 1980-81) reveals interesting information. About 42% of the outgoing goods and 54% of the incoming goods are to or from Tamilnadu. About 12% of the outgoing and 21% incoming goods are to or from Karnataka. Maharashtra is also an important origin of incoming

TABLE XIX

Import and Export Tonnage of Cargo Handled and Revenue Collected at the Intermediate and Minor Ports of Kerala (1985-86)

Sl. No.	Name of Port	Import (Tonnes)			Export (Tonnes)			Total (Tonnes)			Revenue earned Rs.	
		Coastal	Foreign	Total	Coastal	Foreign	Total	Coastal	Foreign	Total	1984-85	1985-86
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
I. Intermediate Ports:												
1	Neendakara	..	..	..	..	63,414	63,414	..	63,414	63,414	18,23,369	10,48,663
2	Calicut/ Beypore	12,332	..	12,332	22,269	5,036	27,305	34,601	5,306	39,637	4,23,960	5,60,567
3	Alleppey	..	..	..	..	..	..	..	..	..	22,616	1,16,448
4	Vizhinjam	..	..	..	..	..	..	..	..	..	215	7,199
II. Minor Ports												
5	Trivandrum	..	..	..	..	..	..	..	..	..	11,746	14,155
6	Quilon	..	..	..	..	..	..	..	..	..	..	..
7	Kodungalloor	..	..	..	..	..	..	..	..	..	40,777	27,868
8	Ponnani	..	..	..	..	..	..	..	..	..	12,407	4,132
9	Badagara	..	..	..	..	..	..	..	..	..	14,589	7,506
10	Tellicherry	..	..	..	..	..	..	..	..	..	7,404	8,506
11	Cannanore	..	..	..	..	..	..	..	..	..	4,761	4,839
12	Azhikal	..	..	..	8,504	..	8,504	8,504	..	8,504	57,766	50,861
13	Kasaragod	..	..	..	..	..	..	..	..	..	19,847	27,517
	Directorate of Ports	..	..	..	..	..	..	..	..	..	79,185	43,28,707
	Total	12,332	..	12,332	30,773	68,450	99,223	49,105	68,450	1,11,555	25,18,642	62,06,968

goods and destination of outgoing goods. These three States account for more than 70% of the outgoing and 85% of the incoming goods. Walayar checkpost on the Palghat-Coimbatore route accounts for 59% of the outgoing goods and 52% of incoming goods. The main outgoing goods are rubber and rubber products, coconut and oil, aluminium and aluminium goods, tyres and tubes and parcel goods. The main incoming goods are groceries, machinery, textiles, plastic goods, medicine, cement and vegetables, rice, sugar, steel and steel products, cement and parcel goods.

A part of the commodities transported through the check posts are not for sale. They are either for household use or transfer of stock from one depot to another.

Data on railborne statistics for the decade 1968-69 to 1978-79, compiled by the State Planning Board show that the railways handled the movement of a wide ranging variety of products classified into 440 items ranging from paddy to iron and steel and coal. The railway net work in Kerala consists of 840 km. of broad gauge lines and 113 km. of metre gauge lines. There are 160 stations and train halts in Kerala. The magnitude of the trade handled by the railways is given in the adjoining tables.

The Indian airlines operate services from Trivandrum and Cochin. There are flights to Trichy, Madras, Bombay, Delhi, Bangalore and Madurai from these airports. In addition, two international flights to Colombo and Male are operated from Trivandrum. The volume originating freight traffic was 2,365 tonnes in 1984-85. International flights to Dubai, Abudhabi, Kuwait, Doha, Rasal Khaimah and Sharjah are operated from Trivandrum by Air India. The details of freight traffic handled by the Indian Airlines from Trivandrum and Cochin Airports during 1983-85 is given below. The handling of Air Cargo is through the TACT—a subsidiary of the Kerala State Industrial Enterprises.

TABLE XX

Railborne Goods Traffic in Kerala in the Seventies (Quantity in '000 tonnes)

Year	*Export*		*Import*		*Total Goods Traffic*	
	Quantity	*Index*	*Quantity*	*Index*	*Quantity*	*Index*
1968-69	1,843	100.00	1,634	100.00	3,477	100.0
1970-71	1,692	91.8	2,026	124.0	3,718	106.9
1974-75	1,744	94.6	1,991	121.9	3,735	107.4
1978-79	1,724	93.5	2,394	146.5	4,188	118.4

Source:—District-wise railborne goods traffic in Kerala 1978-79, Data Bank, State Planning Board, Trivandrum, May 1980
1968-69=100

TABLE XXI

District-wise Railborne Goods Traffic in Kerala 1978-79

(Quantity in, 000 tonnes)

Sl. No.	District State	No. of railway stations	Export		Import		Total goods traffic	
			Quantity	*Percentage*	*Quantity*	*Percentage*	*Quantity*	*Percentage*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	Trivandrum	16	18	1.0	114	4.8	132	3.2
2	Quilon	21	61	3.5	190	7.9	251	6.1
3	Alleppey	7	21	1.2	49	2.0	70	1.7
4	Kottayam	9	48	2.8	09	4.6	157	3.8
5	Ernakulam	24	1,383	80.2	505	21.1	1,888	45.9
6	Trichur	15	55	3.2	90	3.8	145	3.5
7	Palghat	27	9	0.5	890	37.2	889	21.6
8	Malappuram	14	27	1.6	25	1.1	53	1.3
9	Calicut	18	82	4.8	305	12.7	387	9.4
10	Cannanore	29	20	1.2	116	4.8	136	3.3
11	Kerala State	180	1,724	100.0	2,394	100.0	4,118	100.0

Source:—District-wise Railborne Goods Traffic in Kerala 1978-79. Data Bank, State Planning Board, Trivandrum, May, 1980

TABLE XXII

Air Traffic—Freight—(Indian Airlines) From Trivandrum and Cochin Air Ports (1983-84 to 1985-86)

Sector	Originating Traffic			Sector	Terminating Traffic		
	1983-84 (*Tonnes*)	1984-85 (*Tonnes*)	1985-86 (*Tonnes*)		1983-84 (*Tonnes*)	1984-85 (*Tonnes*)	1985-86 (*Tonnes*)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trivandrum—Bangalore	..	..	3.5	Bangalore—Trivandrum	..	..	9.9
Trivandrum—Bombay	220.5	439.4	324 6	Bombay—Trivandrum	2,418.1	1,289.6	1,420.0
Trivandrum—Madras	62.4	94.5	88.9	Madras—Trivandrum	306.0	461.4	300 2
Trivandrum—Cochin	258.0	406.2	216.5	Cochin—Trivandrum	32.8	80.1	103.1
Trivandrum—Dabolin	..	0.9	0.3	Dabolin—Trivandrum	..	..	0.8
Trivandrum—Delhi	..	..	1.8	Delhi—Trivandrum	..	5.8	139.5
Trivandrum—Male	442.5	688.6	385.2	Male—Trivandrum	17.1	14 3	11.2
Trivandrum—Colombo	6.8	15.5	106.0	Colombo—Trivandrum	105.0	87.0	73.6
Trivandrum—Trichy	6.5	4.0	5.4	Trichy—Trivandrum	36.8	102.7	117.2
Cochin—Bombay	524.7	592.1	720.2	Bombay—Cochin	1,843.4	256.2	349.3
Cochin—Bangalore	29,5	72.7	96.3	Bangalore—Cochin	156.7	249.1	235.5
Cochin—Delhi	..	1.6	19.2	Delhi—Cochin	..	5.4	89.0
Cochin—Dabolin	..	1.2	42.7	Dabolin—Cochin	..	0.4	7.8
Cochin—Madras	41.0	47.6	57.9	Madras—Cochin	134.5	167.2	169.8
Cochin—Coimbatore	N.A.	..	..	Coimbatore—Cochin	N.A.	..	..
Cochin—Madurai	..	0.5	23.0	Madurai—Cochin	..	58.7	206.1
Total	1,591.9	2,364.8	2,093.5		5,050.4	2,778.4	3,449.5

(b) Trade Centres

Marketing comprises of all activities involved in the flow of goods and services from the producer to the consumer-storage, transport, processing and the like. It is a technique for improving economic mobility. Both marketing and production process, are enmeshed in the economic system in such a manner, as to render the former an important and influential role. As a consequence of the successive Five Year Plans since 1951, productivity has improved giving a new impetus to the economy. Data from varied sources indicate that there has been a real and absolute increase in the standard of living. The old notions of marketing as an unfair technique confined to urban or semi urban clientele are fast changing. Marketing is now seen as a valuable tool for economic spread within and without. There has been a conscientious effort at encouraging and subsidising investments in non-industrialised backward areas to encourage the dispersal of organised private sector industry from the urban centres as well as to foster more balanced economic development. This process has been catalysed by the penetration of the branches of nationalised banks into rural areas backed up by the phenomenal growth of mas media particularly the transistor and the television. All this represents the positive effect of marketing over the years. The Green Revolution itself was the outcome of marketing a scientific technology to the rural masses. In a short span, the use of hybrid varieties and chemical fertilisers, became widely diffused The rural market could be compartmentalised into two—one for consumption goods including both fast moving consumer goods and durables and the other for agricultural inputs and other investment goods.

The markets in the State have been classified under two categories viz. wholesale and retail. The wholesale market is defined as one in which relatively a large scale transaction of purchase for further sale is effected. The retail market on the other hand is one where relatively small scale transactions of purchase mainly by the consumer or retail merchants take place. The same market may be a wholesale market in respect of one commodity and a retail market for another. A market is considered as a wholesale market provided there is regular large scale transaction for further sale in respect of at least one commodity.

There are 1,363 markets in the State of which 348 are wholesale markets while the remaining are retail markets. The maximum number of markets are in Quilon and Trivandrum Districts, the number being 273 and 222 respectively. In Wynad and Kasaragode Districts, there are only 13 markets. Some of the markets

are held once in a week or on specified days of the week. Others are daily markets. In these markets, the daily requirements of the populace, such as vegetables, fish, coconut etc., are sold. Besides these rural marketing centres, there are important fairs and melas held in connection with the festivals in temples or churches. In these melas, copper and aluminium vessels and several other articles of domestic use required by the people are assembled for sale. Cattle fairs are also held in important places.

Regulated Market

Arecanut is the only commodity notified for transaction, in the purview of the Regulated Market Act in the State. The Regulated Markets in the erstwhile Malabar District are nominal, and function under the Malabar Market Committee located at Calicut constituted as per the provisions of the Madras Commercial Crops Act of 1933. The Collector of Kozhikode is the Ex-officio Chairman of this Committee. Under the provisions of the Act, no transaction should take place within the notified area except in the regulated market. Hence the produce within this time has to be brought to this market for sale under the supervision of Market Committee staff. In case any trader violates these rules he will be liable for prosecution. In this market no market fees or deductions are leviable

The very purpose of introducing the regulated market is to regulate the trade practice, by avoiding unhealthy practices now rampant and by prescribing various charges like unloading, weighing etc. and thereby increasing the producer's share in the consumer rupee. All the market functionaries are licensed and the various charges clearly specified. The transaction is effected under the direct supervision of the market superintendent. No unauthorised deductions in the value of the produce is permitted. The chit tender system is followed whereby the produce brought in baskets are displayed in lots arranged serially, and numbered. The intending buyer quotes his prices after proper examination of the produce. The quotations are scrutinised by the market committee functionaries and the highest quotation is awarded the right of purchase. Payment is effected forthwith.

Establishment of regulated markets helps not only the producers and consumers but also the State Government in its gathering effort in the agricultural sector. Regulated markets could be successfully organised in the State for commodities like coconut, pepper, cashew, arecanut and ginger.

Centres of wholesale business and mandies

The important wholesale trade centres are spread all over the State, but concentrated chiefly in District headquarters and handle a wide variety of agricultural commodities. The District Gazetteers

provide a detailed list of centres and commodities traded. Storage facilities are provided by the godowns provided by the Central and State warehousing corporations, banks, merchants and exporters and importers. The commodity movement is arranged through forwarding and commission agents. The commodities arrive at the wholesale centres by water, rail and road. Transactions particularly of rice take place in two ways (1) The mill owners from the supplying centres send large quantities of rice at their expense to the wholesale dealers and arrange to sell them according to the prevailing market rates on commission, (2) The wholesalers engage commission agents for purchasing rice from the different supplying markets. Brokers are also present in the market for effecting sales between the representatives of the mill owners and the wholesale dealers as well as between wholesale dealers and big retailers. Most of the wholesale dealers trade on commission basis with the mill owners. The price of rice is determined by the price in the supplying centre and the stock position.

There is a forward market for coconut oil and pepper at Ernakulam and Alleppey. These institutions facilitate transfer of risks flowing from price uncertainties which cannot be covered by any other means of insurance. It is claimed that these forward market has a built in mechanism for stabilising ready market prices which are prone to fluctuate in response to unpredictable shifts in market supplies.

It would be interesting to reproduce here the report of the high level committee on land and water resources, State Planning Board, Trivandrum, May 1984 (p. 173 & 174). "Agricultural marketing in Kerala is yet to develop on organised lines, in view of the predominance of cash crop in the State's agricultural economy. The marketing aspect becomes all the more important since many of the cash crop produced in the State have not only a national market, but international markets as well. The major commodities involved are rubber, pepper, tea, coffee, cashew, cardamom, coconut, arecanut, etc. The value of the output of these major commercial crops is well over Rs. 700 crores per annum and their annual trade turn over may amount to over Rs. 500 crores. It may be pointed out in this context, that many of these major items are presently controlled by the Central Commodity Boards some of which as in the case of Rubber and Coconut are concerned with the production aspects and others such as tea, coffee, cardamom etc. are mainly concerned with trading activities. In the case of the latter group of commodities, certain traditional marketing arrangements exist at present. In the case of tea, the auctions at Cochin cover as much as 80 per cent of marketable quantity, while in the case of coffee, trade is governed

by the regulations of international pooling. In respect of cardamom as much as 60 to 70 per cent is covered by well organised auctions at a few selected auction centres in the high ranges.

In the case of commodities which are not marketed through organised channels and in respect of which the annual price fluctuations are quite substantial as in the case of coconut and copra, for example, the producers are put to a very great disadvantage. As far as copra is concerned about a dozen dealers in Cochin control the inter-state trading and the market is therefore, subject to strong monopsonist pressures. These dealers sell in turn to an equally small number of expeller units mostly concentrated in Maharashtra. Recently, the Kerala State Coconut Development Corporation has entered the field of coconut processing. Two units have been set up in the State. In the case of rubber, again, a handful of large scale manufacturers outside the State are the main buyers and they are in a position to influence the price levels. In addition, the import policies of the Government of India also have an impact on price levels of such commodities. A well organised marketing system can go a long way in not only minimising price fluctuations in respect of such commodities but it would also help producers and production. A survey conducted by the Directorate of Economics and Statistics shows that in respect of a large number of agricultural commodities including paddy, a major portion of the trade transactions takes place in villages where they are produced. Of course, their proportions vary from crop to crop. The following sets out the position in respect of some of the agricultural commodities.

TABLE XXIII

Commodity	*Village*	*Sold in markets*	*Through Co-operatives*	*Total*
Paddy	98.4	1.6	..	100
Coconut	81.1	17.5	1.4	100
Tapioca	49.6	50.4	..	100
Arecanut	56.1	42.2	1.7	100
Pepper	34.7	60.1	5.2	100
Ginger	90.5	9.5	..	100
Cashew	65.2	34.8	..	100

It has been estimated that there are in all about 2000 markets in Kerala which conduct daily, biweekly or weekly, sales and purchases. These markets are controlled by municipalities, panchayats, market committees or private individuals. There are also about 90 primary marketing societies in the co-operative sector. The various market functionaries operating in the markets are commission agents, middlemen and brokers, wholesale merchants and retailers. The main market practices noticed are negotiation, bargaining, commission basis and auction sale. There is also a very limited area covered by regulated markets in the erstwhile Malabar region of the State. These markets deal only with arecanut trade and have not been functioning effectively.

The absence of organised marketing channel in respect of many of the State's agricultural commodities has also resulted in considerable price spreads. Leaving aside paddy for the present, in respect of many of the commodities, the price-spread has ranged between 74 per cent in the case of coconut and 65 per cent in the case of pepper to 52 per cent in the case of tapioca. This indicates the extent of trade margins appropriated by middlemen. The other marketing problems relate to absence or lack of grading at the primary level, lack of storage and transport facilities, lack of proper market intelligence, unauthorised deduction in cash and kind, defective weighment, adulteration, etc , to mention a few important ones".

The dissemination of market intelligence in leading markets of Kerala is done by the Directorate of Economics and Statistics. Price bulletins prepared on the basis of intelligence received are broadcast daily over the All India Radio Stations at Trivandrum, Alleppey, Trichur and Kozhikode. The adjoining table gives the market-wise list of commodities, whose daily prices are broadcast. In all 32 commodity prices in 38 markets are covered in the scheme

Market-wise name of commodities included in the bulletin

1. *Trivandrum*

Palmgur (local)-
Palmgur (pandy)
Canegur (Nadan)
Canegur (Pandy I)
Canegur (Pandy II)
Greengram (polish)
Greengram (Bezawada)
Blackgram
Dhall
Bengalgram
Banana
Sugar
Rice (Rose)
Rice (Chamba)
Tamarind seed powder
Tobacco
Cotton yarn

2. *Neyyattinkara:*

Tapioca (raw)
Coconut
Banana
Plantain
Cotton yarn

3. *Nedumangad:*

Pepper
Arecanut (ripe)
Arecanut (pass)
Tapioca (raw)
Tapioca (dry)
Cashew (local)
Banana
Plantain
Rubber
Egg (Hen's)

4. *Quilon:*

Sugar
Coconut oil
Copra
Cashew (local)
Cashew (East Africa)
Cashew (Kernel)
Palmgur
Rice (Nadan)
Rice (Karnataka)
Tobacco
Tamarind seed powder
Egg (Hen's)
Tapioca

5. *Punalur:*

Pineapple
Banana
Rubber
Tobacco
Tamarind seed powder
Egg (Hen's)

6. *Adoor:*

Cashew
Pepper
Tapioca (raw)
Tapioca (dry)
Coconut
Ginger
Arecanut
Tobacco
Tamarind seed powder

7. *Kadakkal:*

Pepper
Arecanut
Cashew
Tapioca (raw)
Tapioca (dry)
Banana
Cocoa

8. *Alleppey:*

Rice (Jaya)
Rice (Punja)
Sugar
Coconut oil
Copra
Oil cake
Pepper (Palm)
Pepper (Thekkan)
Coir (Anjengo)
Coir (Arattupuzha)
Tamarind seed powder
Tobacco

9. *Chengannoor:*

Coconut oil
Copra
Coconut
Tapioca (raw)
Banana
Arecanut
Palmgur
Tobacco
Egg (Hen's)
Tamarind seed powder

10. *Thiruvalla:*

Coconut oil
Coconut
Copra
Banana

11. *Kayamkulam:*

Coconut
Tapioca
Canegur

3|0603|MC.

Palmgur
Tamarind seed powder
Egg (Hen's)

12. *Pulinkunnu:*

Coconut oil
Copra
Coconut
Egg (Hen's)

13. *Kottayam:*

Sugar
Coconut oil
Copra
Coconut
Rubber
Tapioca (dry)
Canegur
Rice (Jaya)
Rice (culture)
Tobacco
Tamarind seed

14. *Changanassery:*

Copra
Tapioca (raw)
Tapioca (dry)
Canegur
Tobacco
Banana
Tamarind seed powder
Egg (Hen's)

15. *Palai:*

Coconut oil
Pepper
Ginger
Turmeric

16. *Ernakulam:*

Coconut oil
Copra
Oil cake
Coconut
Arecanut
Banana
Rice (Matta)
Rice (I. R. 8)
Sugar
Canegur
Tobacco

17. *Cochin:*

Coconut oil
Coconut
Coir
Pepper
Tamarind seed powder
Ginger
Rubber
Turmeric
Lemongrass oil
Canegur
Bengal gram
Tobacco
Arecanut
Cardamom

18. *Alwaye:*

Coconut oil
Copra
Pepper
Banana
Lemongrass oil
Canegur
Tamarind seed powder

19. *Moovattupuzha:*

Pepper
Ginger
Banana
Lemongrass oil
Rubber
Tobacco
Tamarind seed powder

20. *Kothamangalam:*

Pepper
Turmeric
Ginger
Lemongrass oil
Rubber
Arecanut
Tobacco

21. *North Parur:*
Coconut oil
Copra
Oil cake
Coconut
Arecanut
Banana
Tapioca (raw)
Tapioca (dry)
Tobacco
Tamarind seed powder
Egg (Hen's)

22. *Kalady:*
Rice (not broadcaste)

23. *Thodupuzha:*
Pepper
Ginger
Banana
Coconut
Tapioca
Cardamom
Rubber
Cocoa (not included in the Bulletin)

24. *Trichur:*
Rice
Sugar
Coconut oil
Coconut
Coconut cake
Banana
Arecanut
Cashew nut
Tobacco

25. *Kodungallur:*
Coconut oil
Coconut oil cake
Copra
Coconut
Arecanut (dry)
Tapioca (raw)
Tapioca (dry)
Banana
Tobacco
Canegur

26. *Kunnamkulam:*
Arecanut (ripe)
Arecanut (dry)
Banana
Tobacco

27. *Irinjalakuda:*
Coconut oil
Copra
Coconut oil cake
Coconut
Pepper
Canegur
Banana
Tapioca (raw)
Tapioca (dry)
Tobacco
Cashewnut
Rice

28. *Palghat:*
Coconut
Sugar
Ginger
Arecanut
Tobacco
Banana
Canegur
Ground nut
Rice
Paddy

29. *Chittur:*
Paddy
Rice

30. *Alathur:*
Rice

31. *Manjeri:*
Coconut
Pepper
Banana

32. *Ponnani:*

Coconut (with husk)
Arecanut
Tapioca (raw)
Tapioca (dry)
Coconut (without husk)

33. *Badagara:*

Coconut oil
Copra
Coconut oil cake
Coconut
Pepper
Canegur

34. *Tellicherry:*

Coconut (with husk)
Coconut (without husk)
Copra
Pepper
Ginger
Rubber
Lemongrass oil
Arecanut
Tobacco
Banana
Tapioca (dry)
Egg (Hen's)

35. *Calicut:*

Coconut oil
Copra
Coconut oil cake
Coconut (without husk)
Coconut (with husk)
Coir
Pepper
Ginger
Cardamom
Lemongrass oil
Cotton yarn
Arecanut (ripe)
Arecanut (dry)
Tobacco
Tapioca (raw)
Tapioca (dry)
Canegur
Egg (Hen's)
Rubber
Sugar

36. *Cannanore:*

Coconut oil
Copra
Coconut oil cake
Coconut
Tapioca
Cotton yarn
Banana
Canegur

37. *Baliyapattom:*

Pepper
Ginger
Rubber
Arecanut (dry)
Tapioca (raw)
Tapioca (dry)
Banana

38. *Kanhangad:*

Coconut oil
Pepper
Rubber
Arecanut (dry)
Banana

Important Wholesale Markets

1. Trivandrum
2. Neyyattinkara
3. Nedumangad
4. Quilon
5. Punalur
6. Adoor
7. Kadakkal
8. Alleppey
9. Chengannoor
10. Thiruvalla
11. Kayamkulam
12. Pulinkunnam

13. Kottayam
14. Changanassery
15. Palai
16. Ernakulam
17. Cochin
18. Alwaye
19. Moovattupuzha
20. Kothamangalam
21. North Parur
22. Kalady
23. Thodupuzha
24. Trichur
25. Kodungallur
26. Kunnamkulam
27. Irinjalakuda
28. Palghat
29. Chittur
30. Alathur
31. Manjeri
32. Ponnani
33. Badagara
34. Tellicherry
35. Calicut
36. Cannanore
37. Baliyapattom
38. Kanhangad.

List of Commodities traded in the Major Wrolesale Markets

1. Palmgur (Local & Pandy)
2. Canegur (Nadan & Pandy I & II)
3. Greengram (Polish & Bezwada)
4. Blackgram
5. Dhall
6. Bengal Gram
7. Banana
8. Sugar
9. Rice (Rose, Champa, Nadan, Karnataka, Jaya, Punja, Culture, Matta, I. R. 8)
10. Tamarind Seed Powder
11. Tobacco
12. Cotton Yarn
13. Tapioca (Raw, Dry)
14. Coconut (with husk, without husk)
15. Plantain
16. Cotton Yarn
17. Pepper (Palai, Thekkan)
18. Arecanut (Ripe, Pass)
19. Cashew (Local, East Africa)
20. Rubber
21. Egg (Hen's)
22. Coconut Oil
23. Pineapple
24. Ginger
25. Cocoa
26. Oil Cake
27. Coir (Anjengo, Arattupuzha)
28. Turmeric
29. Lemongrass Oil
30. Cardamom
31. Groundnut
32. Paddy

Fairs and Melas

In the inscriptions of the sixteenth and seventeenth centuries and earlier, village bazaars and fairs are mentioned where the retail trade in rice, betel leaves, pulses, oil, pepper, milk, jaggery and fabrics, cotton, thread, fruit, salt, artisan's goods took place. F. Buchanan wrote that in good parts of the country, the inhabited places with weekly markets were at a distance of two or three miles one from another. Some regional division of labour arose. The Malabar pepper and other spices were in demand all over Southern India and in the foreign markets. There was not enough rice in Malabar and the import of rice there from Gujarat, the Coromandal coast and Bengal continued to be important. The trade in food grains indicates the existence of a surplus and deficit area and contradicts theories which postulate a uniform pattern of self sufficiency for the entire sub-continent. It is not known whether any of the inter-regional flow of food grains was meant for the rural consumers. Urban consumers in the deficit areas, both rich and poor were evidently dependent for at least part of their requirements on 'imported food'. At Mirjan near Honavar in Kanara, Barbosa saw the traders from Malabar purchase a 'great store' of very coarse black rice for the very poor people. It is possible but unlikely that such poor people were exclusively urban.

A major source of food grains for deficit areas was Bengal. The cheapness of food stuff in that region was not merely the result of inadequate supply of special as Moreland suggested: the abundance of all varieties of food in Bengal impressed observers without exception. Bengal rice was sent up the Ganges to Agra via Patna and Coromandal and round the Cape to Kerala and various port towns on the West Coast.

Still almost certainly the economic needs of the pre-colonial rural Kerala like rest of India were met mostly from its own produce distributed through customary arrangements rather than through exchange. The inter local trade—both the country to town and inter-town flow of commodities was essentially a short distance version of the inter-regional trade. A variety of items entered into the inter regional trade. Of these Malabar's trade in pepper, ginger, cardamom, radix china and wild cinnamon appear to be of importance. Merchants from Bijapur and the Carnatic procured pepper at

Cochin and Cannanore. Spices as well as arecanuts, coconuts and palm candy were regularly carried in Malabar ships or by Chetti merchants to Coromandal, the Konkan coast and Gujarat (Baldaeus and Barbosa). The trade between Malabar and Gujarat—mainly trade in pepper for opium and cotton—was disrupted when the Dutch established a monopoly over the pepper and opium trade.

There are many fairs and melas all over the State. These fairs are periodical markets held once a year, and usually associated with important religious festivals attached to either a Temple, Church or Mosque and of a duration of one to two weeks. In some of the major fairs and melas, traders from within and outside the State display their wares for sale. The average attendance in these fairs exceed more than a lakh. In addition there are also largely attended cattle fairs in Quilandy (like the Kizhir fair*) and occasionally exhibitions of a general nature. In the areas adjacent to tribal settlements, handicrafts of tribals are also put on sale. Articles of every day use are mostly sold in the fairs and melas. The importance of fairs and melas lie in that they are "the meeting ground of livestock and agricultural commodities, of many religions and cultures, crafts and motives from far and near, of ideas and design, workmanship, excellence and finish, of tools and appliances, of trends of the future and vanishing practices of the past, of adaptability and local variation, of skill and imagination. They show what an extensive network of seasonal and perennial market village fairs still provide to native craftsmanship and industry. Secondly they help to connect economic streams with social and religious movements. Thirdly they suggest how a succession of small fairs in a time series culminate in a very big fair, almost always in the heart of a particular area, and how this big event gradually subsides through another time series of small fairs, so that an endless cycle of trade, social and religious inter-course is kept in motion. Fourthly they insinuate a great deal about the situation of the artists and manufacturers, the mode of providing their goods, the usual rate of their labour, any particular advantages they may enjoy; their comparative affluence with respect to the cultivators of the land, their domestic images, the nature of their sales and the regulations respecting their markets. Fifthly they can very greatly help

* The number of animals assembling exceeds 30,000.

in reconstructing the trade routes, the nature of conveyance of goods by land and water and the means by which they can be facilitated, especially by making or repairing roads. Indeed they represent a great cultural heritage."

Among the variety of articles commonly available for sale in these fairs and melas are costly silks, wedding wear with gold thread embellishment, fanciful drapery articles of varied lines and forms, umbrellas, goldware, bell metal vessels of different types and sizes, furniture, rattan and bamboo works, ironware ranging from kitchen knives to agricultural implements of all varieties, crockery, stationery, confectionery, earthenware, mats, baskets etc.

At the 1961 Census, about 270 fairs and melas were reported. But this by no means could be claimed to represent all the fairs and festivals in the State.

A substantial volume of trade in agricultural commodities passes through these periodic markets. However there is little or no control exercised by any authority on the transactions or trade practices. Often the only control exercised is the levy of market charges on carts or head load of commodities or livestock brought for sale.

Co-operation in wholesale and retail trade

The consumer co-operatives function as one of the principal agencies in the public distribution system. The Kerala State Co-operative Consumers Federation, the District Wholesale Stores at District Headquarters and 361 primary Consumer Stores form the structure of Consumer Co-operatives. Besides, 1,615 consumer outlets of primary credit societies are engaged in the distribution of consumer articles in rural areas. 1,179 *Sahakarana Maveli* Stores also distribute essential consumer articles to the general public. 3,413 students stores (College and School Co-operatives) and two University Central Co-operative Stores meet the requirements of the student community. These have helped to check the price level of essential articles.

The Apex level institution the Kerala State Co-operative Consumer's Federation extends business support to its member Societies. The District Wholesale Stores are undertaking both wholesale and retail distribution of essential consumer goods.

Controlled goods, ration goods, cement, vegetables, wheat products, powdered spices, cooking oil, bakery products, and customs confiscated goods are distributed by them. During 1983-84 articles worth Rs. 28.80 crores were traded by the District wholesale Stores and their branches. Special Sales Campaigns are launched during festival seasons to curb inflationary price changes during such seasons. Onam, Christmas and Bakrid Bazaars are also organised. "Students-markets" at District Headquarters are set up during May-June to help students to obtain their study requirements. The National Co-operative Development Corporation is providing financial assistance to expand the rural distribution net work to back up the public distribution system. The main thrust is towards the establishment of retail outlets as feasible in the Co-operative Sector to serve the under privileged sections and consolidation of the existing structure of consumer Co-operatives by making them financially more viable.

The Kerala State Co-operative Marketing Federation came into existence in 1960 as an Apex body of Primary Marketing Societies in Kerala. The Kerala State Co-operative Marketing Federation is now engaged in the marketing of Agricultural produce like Black Pepper, Cardamom, Ginger, Cloves, Turmeric, Cinnamon, Copra and all Fertilizers and Pesticides of reputed manufacturers in Public and Private Sectors.

The Federation entered the Spices export trade in the year 1966. From the year 1976 onwards MARKETFED could emerge as one of the top most exporters of Indian Spices and during the subsequent years awards for the topmost exporters of Pepper were conferred on the Federation.

Co-operative Marketing

At present co-operatives play an insignificant role in the marketing of agricultural produce in the State. In Kerala, the primary marketing societies are affiliated to the two Apex Federations viz., the Kerala State Co-operative Marketing

Federation. An Inter-State Co-operative Organisation (CAMPCO)* with its headquarters at Mangalore serves the arecanut growers of the State. While all the general and commodity marketing Societies are affiliated to the State Co-operative Marketing Federation. The Rubber Marketing Societies are affiliated to the Rubber Marketing Federation. The two Apex Federations in the State in turn are affiliated to the National Agricultural Co-operative Marketing Federation. Of the 99 Primary Marketing Societies in the State, 21 deal with rubber, 13 with coconut and 11 with fruits and vegetables. While there are only two societies dealing with arecanut, three with cardamom, three with tapioca, and one each with tea and lemon grass, other societies are engaged in transactions connected with various general commodities. Nearly a third of the primary marketing societies do not undertake any marketing activity at present. While two societies have an annual sales turn over of agricultural produce exceeding Rs. 25 lakhs, 17 societies have annual sales below Rs. 1 lakh. Of the 97 societies only 28 are working on a profitable basis. Nearly 1.5 lakh members have enrolled themselves in these societies whose total share capital base is Rs. 13.7 lakhs. The value of agricultural produce and cash crops marketed by the primary co-operatives and apex societies was about Rs. 65 crores in 1978-79.

A serious snag in the working of the primary co-operative marketing societies in Kerala is their inability to adopt local

* The Central Arecanut Marketing and Processing Co-operative Society (CAMPCO) was set up in 1973 to stabilise the price of arecanut from the slump in that year. This Co-operative was formed with financial support from Karnataka and Kerala and has ensured a support price. During the Co-operative year 1984-85, CAMPCO procured arecanut valued at Rs. 62 crores by handling 25,000 tonnes of arecanut. Having a share capital of Rs. 12 crores, CAMPCO proposes to step up the procurement of arecanut to the value of Rs. 78 crores. The total area under arecanut cultivation in the country is 1.75 lakh hectares. With a production of 1.79 lakh tonnes of which about 72% is from Kerala and Karnataka. The procurement centres which were only 5 in 1973 have now risen to 46 in the two States. CAMPCO has also opened sales depots in New Delhi, Bombay, Madras, Calcutta, Kanpur, Nagpur, Hyderabad, Indore, Cuttack and Ahamedabad. CAMPCO has made a gross profit of Rs. 3.47 crores and a net profit of Rs. 1.2 crores. The Rs. 12 crore chocolate factory at Puthur (53 kms. from Kasaragod) is the second venture of CAMPCO. The latest technology from Holland, Switzerland and Italy has been utilised.

trade practices. Though the coverage of markets by marketing societies is not that inadequate, majority of the societies are not financially strong to undertake even marketing operations on a limited scale. The existing coconut processing and marketing societies suffer from draw backs like lack of sufficient funds, absence of linkage between service co-operative societies and the marketing societies on the one hand and between the primary marketing societies and the Apex Federation on the other, violent price fluctuations in the market, bad management and absence of committed leadership. Only the rubber processing societies which are assisted by the State Government and Rubber Board are working in a fairly satisfactory manner.

The marketable surplus of the major agricultural commodities in the State is thus well over Rs. 400 crores. Of this, the co-opeative sector marketing operations account for only about Rs. 65 crores that is about 16 per cent of the total marketable surplus. The co-operatives should be able to handle at least one third of the marketable surplus (about Rs. 140-150 crores) in order to stabilise prices and to give maximum prices to the producers.

State Trading, Fair Price Shops etc.

Public distribution of essential consumer commodities such as food grains, edible oils, fuel, assume added importance in Kerala which is chronically deficit in food. The State's internal production of foodgrains is barely adequate to meet only a few month's requirements. Over the years, a smoothly functioning public distribution net work has been built up. At the time of the formation of the State in November 1956, there were a little over 8,000 ration shops functioning. These shops supplied rice, wheat, and such other cereals as had been brought under rationing. In the urban areas statutory rationing was in force under which a certain quantity of rationed commodities were made available to every card holder. The accent has been to ensure a regular supply of the food requirements by maintaining a permanent machinery covering the entire area. There are at present 43.80 lakh card holders. A steady expansion of the system is discernible. From about 8.000 ration shops in 1956, the State now has 12,500 shops located in 1,000 Panchayats, 50 Municipalities and 3 Corporations in the State. In locating the shops, care has also been taken to see that no one has to walk more than two kilometres to one's rationshop. The table below gives details of the functioning of the public distribution net work in Kerala.

TABLE XXIV

Public Distribution System for the Distribution of Essential Commodities in Kerala

Particulars	Units	1984	1985	1986
1. No. of Ration Card and Permits (as on 1st April):				*
(a) Ration Cards for Families	Nos.	4,298,362	4,373,244	4,447,714
(b) Ration Permits for Institutions	,,	7,617	7,922	7,987
2. No. of F. C. I. Sub Depots:	,,	22	21	22
3. No. of Wholesale Shops:				
(a) Co-operative	,,	45	46	46
(b) Others	,,	235	241	245
(c) Total wholesale shops	,,	280	287	291
4. No. of Retail Shops:				
(a) Co-operatives	,,	1,532	1,441	1,400
(b) Others	,,	10,625	11,061	11,228
(c) Total Retail Shops	,,	12,157	12,503	12,628
5. Quantity of coarse cloth (Allotment)	Std. Bales	5,573	1,491	2,787.25
6 Sugar (Allotment):	M. T.	131,546	11,228.6	11,227.2
7. Palm Oil (Allotment)	,,	47,500	N.A.	N.A.
8. Kerosene (Allotment)	,,	172,985	15,000	15,780

* Wheat products ared distributed through the outlets of the C.S. Corporation.

Source: Directorate of Civil Supplies.

Availability of Food in the State

	Particulars	*Unit*	1982	1983	1984	1985 *Provisional*
1.	Population of the State	Lakh	259.04	263.63	268.30	273.05
2.	Production of Rice in the State	,,	13.39	13.06	12.08	12.56
3.	Availability of Rice for consumption from production within the State*	,,	12.05	11.75	10.87	11.30
4.	Import of Rice on State Account**	,,	11.70@	12.97@	13.60	14.60
5.	Import of wheat on State Account	,,	0.67@	0.20@	4.20	4.20
6.	Production of Raw Tapioca	,,	37.45	38.49	39.04	39.53

The Kerala State Civil Supplies Corporation was formed in June 1974 to streamline the distribution of essential commodities in the State. It is currently engaged in the (wholesale and retail) of rice, pulses, tea, coffee, edible oils, cement, sugar, etc. Apart from the above functions, the Corporation organises extensive festival markets during important festivals like Onam, Christmas and Bakrid. The Corporation has 155 Maveli Stores, 3 Mobile Maveli Stores, 3 Super Markets, 5 petrol bunks, 3 vegetable outlets, one L.P.G. outlet and one textile outlet. One of the major activities of the Corporation is the distribution of coconut oil procured under the price support scheme for coconut. The details of

*Ten per cent of production is set apart for seed, feed and wastage and the rest alone is accounted for consumption.

**Firm data are not available on the import of rice into the State by private trade. Hence availability through this source is not included.

@Quantity of rice and wheat drawn from Food Corporation of India.

the essential commodities distributed by the Corporation are given below.

TABLE XXV

Essential Commodities distributed by Kerala State Civil Supplies Corporation

Item	1984-85 4/84 *to* 3/85		1985-86 4/85 *to* 3/86	
	Quantity (in tonnes)	*Value (Rs. in lakhs)*	*Quantity (In tonnes)*	*Value (Rs. in lakhs)*
1. Wheat	..	..	..	..
2. Wheat products	2,661	84	418	0.4
3. Rice	67,759	1,939	45,510	1,335
4. Pulses	1,439	79	2,853	314
5. Coconut Oil	45	16	5,039	739
6. (a) Palm oil	..	..	..	..
(b) Palmolein oil	51,048	6,086	30,850	4,300
7. Provisions and other items	..	120	..	20
8. Vegetables	..	36	..	42
9. Sugar	1,266	66	10,824	613
10. Tea	..	..	..	..
11. Paper for Note books	1,050	298	772	232
12. Uniform cloths to students ('000 metres)	..	..	..	..
13. Textiles	..	9	..	..
14. (a) Motor spirits	..	..	..	..
(b) High Speed Diesel	—	..	..	..
(c) Lubricant	..	422	..	515
15. Cement (Free sale)	14,631	221	19,390	296
16. Confiscated goods	..	..	..	..
17. Sugar (levy)	132,738	5,250	133,307	5,956
18. Cement (levy)	136,321	1,408	119,224	1,426
19. Others	..	1,410	..	97
Total (value only)	..	17,444	..	15,836.4

Source: Kerala State Civil Supplies Corporation.

The Food Corporation of India (FCI)

Set up in 1965, under an Act, serves the nation in the vital areas of food procurement storage and distribution, protecting the interest of both the farmers and consumers. The Corporation has an annual turnover of Rs. 7,734 crores. Besides the annual purchase of over 175 lakh tonnes of food grains, Food Corporation of India also handles imported food grains. It is the main agency which provides the storage capacity for food grains. Besides its own godowns, the Food Corporation of India hires storage capacity from other sources such as Central and State Warehousing Corporations, State Governments and private parties. There are 22 sub depots of the FCI in Kerala.

The Kerala State Warehousing Corporation

The other two agencies in the public sector, engaged in large scale storage or warehousing are the Central warehousing Corporation (CWC) and the Kerala State Warehousing Corporation set up in February 1959. The main functions of the Corporation with its Head Office at Ernakulam are to acquire and build godowns and warehouses at suitable places within the State, run warehouses for storage and transportation of agricultural produce, seeds, manures, fertilisers, agricultural implements and notified commodities offered by individuals, co-operative societies and other institutions and act as an agent of the Central Warehousing Corporation in the State.

Warehousing was introduced in the country on the basis of the recommendation of the All India Rural Credit Survey Committee. The Agricultural produce (development and warehousing) Corporation Act 1956 provided for the establishment of the National Co-operative Development and Warehousing Board with two distinct funds under its control. The National Co-operative Development Fund, and the National Warehousing Fund, the latter aimed at the planning co-ordination and implementation of the countrywide programme for the development on storage and development of agricultural commodities.. The National and Co-operative Development

Board had to implement this programme through the agencies of the Central Warehousing Corporation and the State Warehousing Corporations. In 1962 the National Warehousing Development Fund was separated and the Warehousing Scheme was set up independently under a special enactment in the Warehousing Corporation Act 1962 (Central Act 58 of 1962) repealing the agricultural produce (Development and Warehousing Corporation Act 1956). The Warehousing Corporation is now governed by this Act. The Kerala State Warehousing Corporation was established on 20th February 1959. The original authorised share capital of the Corporation was Rs. 30 lakhs. Subsequently it was enhanced to Rs. 2.66 crores on 1st April 1986.

Objectives of the Kerala State Warehousing Corporation

The statutory functions of the Kerala State Warehousing Corporation are to, (1) Acquire and build godowns and warehouses at such places within the State as it may with the previous approval of the Central Warehousing Corporation, (2) Run Warehouses in the State for the storage of agricultural produce, seeds, manures, fertilizers, agricultural implements and notified commodities, (3) Arrange facilities for the transport of agricultural produce, seeds, manure, fertilizers, agricultural implements and notified commodities to and from warehouses, (4) Act as an agent of the Central Warehousing Corporation or of the Government for the purpose of the purchase, sales, storage and distribution of Agricultural produce, seeds, manures, fertilizers, agricultural implements and notified commodities, (5) The Corporation may with the consent of the Central Warehousing Corporation and Government, undertake such other functions as are conducive to the promotions of warehousing habits among agriculturists, (6) The Corporation may at its discretion act as storage agent for the purpose of purchase, sale, storage and distribution of agricultural produce, seeds, manures, fertilizers, agricultural implements and notified commodities as defined in the section 2 on behalf of the Government companies as defined in Section 17 of the Companies Act 1956 or a body corporate established by an Act of Parliament or a State Legislature or a Co-operative Society, and (7) The Corporation may, at the request of the State Government or a Corporation established by or under a Central, Provincial or State Act or a Government Company as

defined in Section 617 of the Companies Act 1956 (Act 1 of 1956) or a Co-operative Society prepare a project render consultancy service for construction of warehouse or any matter connected therewith.

The general superintendence and management of the affairs of the Corporation are vested with the Board of Directors nominated by the Share holders. The Central Warehousing Corporation and the State Government are the share holders of the Corporation. Five Directors each are nominated to the Board by the Central Warehousing Corporation and the State Government.

Warehouses

The Corporation has already established 73 warehouses with a total storage capacity of 165,952 Mts. These warehouses are established at important terminal, sub-terminal markets and important producing centres.

As scientific storage is one of the primary duties of the Corporation construction of scientific godowns at all important places was taken up in a phased programme and so far the Corporation has constructed 32 scientific warehouses.

More than 50% of the total storage capacity available with the Corporation is scientifically constructed to facilitate scientific storage. The number of warehouses and storage capacity available with the Corporation from the very inception are tabulated below:

Year	*No. of Warehouses*	*Total storage Capacity (MT.)*
1960-61	8	500
1970-71	23	27,255
1980-81	69	133,295
1985-86	73	165,952

It may be noted that there was considerable improvement in number and capacity of Warehouses from 1971-72 onwards. The impact of this improvements directly reflected in the income of the Corporation by way of storage charges. The number of

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depositors, quantity deposited, credit made available by the Banks on the strength of Warehouse receipts and storage charges realised from the very inception of the Corporation are tabulated below:

Year	*No. of depositors*	*Deposit received*	*Bank advance*	*Storage charges collected*
		(MTs)	Rs.	Rs.
1960-61	361	725	4,44,000	2,669
1970-71	5,471	89,011	60,44,089	5,48,392
1980-81	19,913	67,462	1,92,88,615	57,30,034
1984-85	20,945	454,523	1,93,20,313	1,01,77,221

As a measure of diversification the Corporation facilitates the transportation and handling arrangements of the principal manufactures of fertilizer in the public sector, CARE articles food grains and vegetable oil. It was the first among the 16 State Warehousing Corporations in India to obtain a ship clearance licence from the Customs Department and clear cargo from ships for transportation and storage in various warehouses. The Corporation also participates in the monopoly procurement programme of raw Cashewnut implemented by the Government of Kerala, by arranging a package of services consisting of collection, transportation, of raw nuts to drying yards, drying, packing standardisation, storage and distribution of dried nuts to processing units as an agent of the Kerala State Co-operative Marketing Federation. The Corporation is an agent of the Cement Corporation of India for distribution of cement on behalf of the State Government. The Corporation provides consultancy service for construction of Storage and Loom sheds for the Kerala State Handloom Development Corporation, Kerala Khadi and Village Industries Board and Khadi Commission. It also performs fumigation of agricultural produce in the premises of farmers and traders, export cargo, and fumigation of soil against nematodes. It has entered the public distribution system, through its network by distributing essential commodities such as cement, rice and vegetable oil. During the VII Five Year Plan, another 50,000 M.T. capacity godowns are to be constructed.

Merchant and Consumer Associations

Chamber of Commerce play an important role in the economic development of the country. They help trade, commerce and industry not only by disseminating relevant information but also engage themselves in a continuous dialogue with governmental authorities on behalf of the business community keeping larger national interests in view. Several of the Chamber of Commerce functioning in Kerala have an eventful history. They are voluntary bodies started on the same lines as those existing in the United Kingdom and were initially established by the British businessmen who came to India as traders and subsequently turned to industry. The founding of the Indian National Congress and the birth of Swadesi movement necessitated the formation of Chamber of Commerce to protect and promote the interests of Indian businessmen. Against this back-drop-Chamber of Commerce began to be established in the leading commercial centres of the State like Alleppey, Kottayam, Kozhikode, Cochin, Cannanore and Trivandrum. In the pre-independence period Chamber of Commerce acquired much importance in the sense that they were represented in many public bodies like Municipalities, and Port Trust. They also continue to serve in many public bodies and advisory councils such as Sales Tax Advisory Committee, Import-Export Advisory Committee, Port Advisory Committee, Central Excise Regional Advisory Committee, Minimum Wages Advisory Board, Regional Posts and Telegraphs Advisory Committee, Standing Advisory Committee on Prevention of Food Adulteration Act, State Electricity Advisory Committee, State Export Promotion Council and a host of others. The objectives of the Chamber of Commerce as stated in their articles of association are very wide and far reaching as they seek to promote and protect the interests of trade, commerce and industry. As a result of the above stated objectives the Chamber of Commerce represent the interests of business to Government bodies. Much progress in the inter action with Government has been achieved. Apart from continually ventilating grievances, valuable suggestions on matters relating to constructive industrial and commercial policy have also been made to Government periodically.

Kerala can boast of one of the oldest Chamber of Commerce in India, which was founded as early as 1857 in Cochin by a small group of European traders who foresaw the immense export potentialities of the produce of the Kerala Coast. The Chamber of Commerce have had an important role in the civic affairs of the port towns in which they were mostly located. These merchant organisations served the interest of their members by making representations to the Government, both Central and State on matters affecting trade and commerce, e.g., taxation, tariff and labour issues, collect and circulate among its members statistics and other relevant information of commercial importance. Almost all the major cities and towns have either a Chamber of Commerce or a merchant association to cater to the needs of its members. It is not possible to enumerate the entire list of such bodies, to be incorporated in this section. A detailed list is however furnished in the respective District Gazetteers, to which a reference may be made by those interested.

Consumer movement in Kerala, is still in its infancy like elsewhere in India. Voluntary organizations like Kerala State Consumer Protection Council, the Kerala State Consumer Co-ordination Council and public spirited individuals have been attempting to educate consumers of their rights. Consumer protection has a number of aspects notably physical protection against products that are hazardous, and protection of the public interest against abuse of monopoly position and restrictive trade practices. Measures of self regulation have their inherent limitations. The consumer must be prevented from being mulcted unscrupulous trade practices. In order to safeguard the interests of the consumers in the matter of quantity, quality and price, the existing laws dealing with various aspects of consumer protection are reviewed from time to time. In addition steps are being taken to create awareness among consumers to enable them to establish for themselves the right to physical and economic safety, the right to be informed, the right to choose and the right to be heard. At the centre, the Department of Civil Supplies operates a scheme under which financial aid is provided to voluntary consumer organisations for selected specific projects such as bringing out publications concerning consumer affairs, organizing consumer education and complaint cell etc. Legislative protection to safeguard the interests of the consumers is given by the Essential Commodities Act, 1982 and the Prevention of Black Marketing and

Maintenance of supplies of Essential Commodities Act of 1982, which empower the enforcement authorities to launch expeditious action against offenders.

Weights and Measures

Old units and adoption of the metric system

The old units of weights and measures used in the State were bewildering in their variety and complexity. Though they were known by common names in most parts, their multiples and sub multiples differed from place to place. Most of these were local and of non-standard units. To add to the confusion the landed gentry adopted two kinds of measures, one for receiving the produce, and the other for making payments in kind. Enforcement of regulatory measures was more in the breach than in the observance.

The adoption of the metric system of weights and measures was legally initiated with the passing of the Kerala Weights and Measures (Enforcement) Act of 1958. The system was introduced in a phased manner to avoid bottlenecks to the consumer and the trader. By 1965, the change over was complete. The metric system is unique in that the multiples and the sub multiples bear a decimal relation taken in order. The calculation process is simplified and many of the difficulties experienced in day to day transactions are overcome. Thus it has had a very favourable impact on the common man. Certain loopholes instigating the traders to dupe the common man when the old obscure units were prevalent have been permanently plugged. The long standing difficulties faced by the wholesalers in quoting prices in markets inside and outside the State have been eliminated. Inter State trade is made smooth. The metric system of weights and measures has been one of the important reforms heralded in the country after Independence. The State Government has set up the requisite institutional infrastructure for periodical verification and certification of weights and measures used in commercial transactions so that the consumer is assured of accuracy. The Controller of Weights and Measures functions as the modal point for all activities relating to weights and measures administration. Offences under the Kerala Weights and Measures (Enforcement) Act are dealt with and effective seizure campaigns are conducted by

the Enforcement staff with a view to preventing the use of uncurrently stamped weights, measures etc., besides the annual verification work of weights and measures used in factories and petroleum industry.

Co-operative movement

It would be interesting to recall the observations of Innes in the Malabar Vol. I of the Madras District Gazetteer—1951—"In Malabar it was comparatively late when the first co-operative society was organized. The idea had been prevalent that the soil of Malabar was not congenial to the growth of co-operation owing to the special system of inheritance *(Marumakkatayam)* prevalent and to the peculiar system of land tenure. The first co-operative credit society was registered in 1910 and started work at Kannambra. In 1913-14 there were only nineteen societies, but in 1930 there were 630 affiliated to 24 supervising unions.

The District Central Co-operative Bank was started in 1917-18 and became the chief financing bank. With the increase in the number of societies, the need for non-official supervision began to be increasingly felt, and supervising unions began to be formed to which a number of societies were affiliated. A few years later the District Co-operative Union was started at Calicut.

The District Bank had a share capital of Rs. 1.14 lakhs in 1929-30, a membership of 145 individual members and 556 societies, and secured deposits to the extent of Rs. 32 lakhs and a total working capital of Rs. 27 lakhs. The bank continued to finance adequately the increasing needs of the societies affiliated to it. The statistics of 1929-30 show that 56,000 people were members of co-operative societies, of whom 2,000 were Brahmans, 37,500 Non-Brahman Hindus, 14,000 Muhammadans and 4,000 Christians and Adi-Dravidas. Rs. 12.9 lakhs were due from them on account of loans advanced.

Of the non-credit societies the following deserve special reference For the coir workers of Kallayi a society was started in 1920, and in 1925 an enquiry was made into the possibilities of improving the coir industry in which many of the Tiyas of the Coast were engaged; as a result of that enquiry four more societies were started in Calicut; three more were

formed in 1927 and a central society was started to co-ordinate their work and to act as their agent for joint purchase of coir and sale of finished products. These societies are a source of immense help to the workers. Societies for fish-curers and sellers have been started and they provide fishing materials to the poorer fishermen and enable them to realise the whole profit of their catches. Weavers have their own societies and the first two of them were organised by the Devadhar Malabar Reconstruction Trust in 1922 and have been working satisfactorily. There are now three societies of this class: Similar societies for wholesale purchase and retail sale have been organised for school students, for irrigation, for building houses, and for mat-makers with considerable benefit to their members. There were 28 societies solely for the depressed classes (excluding fishermen) and their membership was 1,266 on 30th June 1931, and working capital Rs. 6,259".

A similar refrain occurs in the Travancore State Manual (Vol. III, Ch. xxv, P. 673) where it was apprehended that '"in Travancore the majority of whose population follows a law of inheritance which does not command or afford facilities for individual credit, the movement cannot be expected to show signs of rapid growth".

The co-operative idea took a concrete shape for the first time in 1904 when the Co-operative Credit Societies Act a measure designed to combat rural indebtedness and to provide for registration of credit societies was passed. Later in 1912, the Co-operative Societies Act also provided for registration of non-credit societies as well as federation of co-operatives. Since then the co-operative movement has progressed specially in the fields of agricultural credit, marketing, supply of farm inputs and distribution of consumer goods. The co-operatives have been closely associated with the implementation of the new 20 point programme. Special emphasis is laid on motivating increased productivity in the agricultural sector. Family adoption scheme is being undertaken by the primary agriculture co-operative societies and urban banks. Each society adopts a minimum of five families belonging to the weaker and underpriveleged sections of society and provides them financial assistance for implementing certain specified schemes to enable them to rise above the poverty line. During the year 1984-85 nearly 3,300 families were the beneficiaries of this programme; which was implemented by nearly 700 societies disbursing an amount of Rs. 1.25 crores. Of these

3.300 families about 2,100 families (63%) belonged to Scheduled Castes and Tribes.

At the time of the formation of the Kerala State on 1st November, 1956 there were 3,917 societies with a total membership of nearly 9 lakhs and a paid up share capital of Rs. 184 lakhs. The Reserve Fund and the working capital of the societies totalled Rs. 169 lakhs and 941 lakhs. Nearly 30% of the State's population had come under the fold of the movement.

At the beginning of the co-operative year (1st July, 1984) 7,715 co-operative societies functioned in the State. Out of this 2,860 were credit societies. Among the credit societies primary agricultural credit societies and primary Land Development Banks are mainly intended for providing credit support to agriculturists by way of short term, medium term and long term loans. The Urban Bank and Employees Credit Societies are extending credit for supporting non-agricultural purposes. Among the non-credit societies, Consumer Co-operatives, Housing Societies, Marketing Societies, Women's Societies, Educational Societies are important. In addition, there are 463 Harijan Societies and 72 Girijan Societies, operating for the benefit of Harijan and Girijan members. The statistical information for the co-operative year 1982-83 relating to various types of societies are appended.

The Department of co-operation headed by the Registrar of Co-operative Societies is charged with the responsibility of promotion, development and regulation of co-operatives.

Besides the above mentioned programme there are also functional co-operatives like Industrial Co-operatives, Dairy, Khadi and Village Industries, Fisheries, Coir and Handloom Societies. Such Societies provide increased employment and income opportunities to different sections of the community like Fishermen, Coir workers, Handloom weavers etc.

On 30th June, 1985 there were 1,430 Primary Milk Co-operative Societies Federated into 10 milk supply Unions. Of these 483 dairy co-operatives are modelled on Anand Pattern whose basic function is procurement of inputs and marketing.

The organisational structure of the fishery co-operatives normally consists of village fishery co-operative societies at base. A superstructure of federation of primary fishery co-operatives has been built up. This consists of Districts and State level federations. Of the total fishermen population of 8.64 lakhs in 1984-85, 1.58 lakhs have been brought under co-operative fold through Village Societies—222 in the marine and 22 in the inland sector. Besides 375 Scheduled Caste and Tribe fishermen have also been covered by the 15 Co-operative Societies formed for them.

There are 1,388 industrial co-operatives in the State (as on 1-4-1985). In the Coir and Handloom industry, the development programme has been designed in such a manner as to bring the industry under the co-operative fold in a phased manner. During 1984-85, there were 544 Primary Co-operatives with a membership of 2.31 lakhs. In the Handloom Sector there were during this period 578 Societies with 54,000 looms i. e., about 57% of the total number of Handlooms in the State. The number of workers in the co-operative sector was 1.36 lakhs.

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TABLE XXVI

General details—Classification of Societies, Membership and Operations as on 30-6-1983

Sl. No.	Type of Society	No. of Societies	No. of members	Share Capital		Deposits	Borrowings
				Total	Government		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				(Rs. in thousands)			
1	State Co-operative Bank	1	13	46,452	3,800	574,333	519,404
2	Central Co-operative Bank	12	4,480	1,74,860	52,798	1,429, 645	7,77,125
3	Central Land Development Bank	1	35	42.376	14,079	5,071	11,65,736
4	Primary Land Development Bank	34	392,123	65,433	4,112	1,019	8,73,605
5	Primary Agricultural Credit Societies including FSS	1,569	4,788,519	3,80,141	54,347	18,99,367	13,81,308
6	Harijan Societies	404	124,177	8,219	6,158	458	12,479
7	Girijan Societies	69	27,655	2,503	1,757	495	3,039
8	Urban Banks	69	750,387	46,115	5	5,29,589	31,834
9	Employees Credit Societies	548	279,289	70,703	420	1,46,6 01	1,08,180
10	Others	53	52,218	3,865	132	41,510	4,115
11	State Marketing Federation	2	107	23,161	20,746	56	1,16,389
12	Primary Marketing Societies	98	162,148	32,492	23,986	9,373	43 963

13	Processing Societies	1	320	490	405	..	158
14	Poultry Societies	55	11,088	506	316	..	182
15	Other Livestock	3	591	15	..	..	..
16	Collective Farming	11	2,456	116	3	..	7,178
17	Joint Farming	44	7,115	637	232	..	55,957
18	Irrigation Societies	19	3,166	81	..	..	141
19	Consumer Federation	1	25	12,097	5,652	..	16,630
20	Wholesale Stores	11	33,418	18,266	16,402	4,351	46,431
21	Primary Consumer Stores	351	171,059	9,708	3,731	6,450	11,936
22	School & Colleges	3,386	4.416,509	7,710	280	573	2,492
23	College Central Stores	2	89	653	500	256	8
24	Housing Federation	1	205	35,466	..	..	3,21,274
25	Primary Housing Societies	269	89,466	39,349	..	..	2,84,282
26	Other Industrial	1	178	1	..	..	3
27	Labour Contract	88	20,352	1,469	286	..	4,088
28	Forest Labour	8	958	15	..	7	10
29	Transport	15	2,468	3,199	2,215	..	6,332
30	Other non-credit (Agricultural) Land Colonisation	8	1,578	46	..	..	266
31	Better Farming	53	8,956	751	..	..	4,250
32	Others	28	6,695	276	..	..	165

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Other Non-credit Non-Agricultural						
33	Women	11	1,301	95	50	..	5
34	Rickshaw Pullers	2	198	5	..	..	..
35	Autorickshaw Societies	28	3,315	4,848	3,159	..	4,618
36	Limeshell Societies	12	3,537	224	61	.	697
37	Lime Burners Societies	1	187	6	..	..	19
38	Washermen	3	135	2	..	..	1
39	Hospital and Dispensaries	68	19,382	6,926	3,482	..	5,392
40	Literary Writers Societies	12	2,702	1,019	676	..	172
41	Printing Societies	20	6,985	708	276	..	763
42	Taxi Drivers Societies	10	1,281	1,226	186	..	1,870
43	Chethu Thozhilali Societies	8	4,037	251	..	..	79
44	Canteen Societies	27	13,083	253	..	..	11
45	Social Welfare	14	5,014	999	580	..	714
46	Others	101	17,355	4,167	2,770	..	5,154
	Grand total	7,512	11,436,255	10,47,900	2,23,604	46,49,154	58,18,474

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CHAPTER VII

COMMUNICATIONS

Old Time Trade Routes and Highways and Modes of Conveyance

Much of the early trade and traffic was carried on by means of water communication in places which had almost an uninterrupted line of natural communications in rivers and backwaters. Some of the ancient literary works, inscriptions and writings of foreign travellers give us bits of information about old time trade routes and highways and modes of conveyance prevalent in the State. Quilon, one of the finest cities of Kerala at that time having magnificent markets and wealthy merchants where brisk trade in pepper took place, was connected with the interior by a wide net-work of roads. The *Unnineelisandesam,* a Malayalam work of the 14th century written by an anonymous author, describes in detail an old time land route called *Kollapperuvazhi* or *Thiruvananthapuram—Kollam Nadakkavu,* which started from Trivandrum and passing along important centres in the present Trivandrum and Quilon Districts reached the town of Quilon which was the capital of Venad. This high road was provided with avenue-trees or *Cholamarams* on both sides of the entire length and was in constant use for more than a century.

The second half of the 18th century witnessed the beginning of the modern system of road communication. The so-called roads which existed before this period were merely open tracks intended for foot-travellers as well as for the nobility who travelled only on horse-back or palanquins. Francis Day in his Land of the Perumals (1861) observed thus: "The usual mode of travelling is by the *Manchel* or Palanquin carried by bearers, each of whom receive 4 pies per mile by bullock or buffaloe carts which are paid at the rate of one anna nine pies a mile and by boats of every description from the comfortable cabin to the little snake boat which can go up very shallow streams". Several good roads were then opened mainly for the convenience of the military and also for traffic and passengers. Lieutenants Ward and Conner in their "*Memoirs of the Survey of Travancore and Cochin*" observed thus: Indeed it may be generally said that the established communications throughout the country are few, indifferent, and reach their object by long detours. In the more western parts of the

rivers (whose navigation would be rendered still more beneficial by the formation of towing paths) and lakes perhaps, in some measure supersede the necessity of roads, but receding from it, communication becomes more embarrassed, and frequently even the most thickly inhabited tracts are only penetrated by narrow paths, skirted by hedges. The difficulties of traverse increase approaching the hills, the country at whose foot is very imperfectly intersected by communications, and those seen are steep, narrow, barely accessible, and almost always impracticable for cattle. To those impediments must be attributed the little general intercourse between the different parts (particularly the interior) of the country, and the timid and jealous policy of the native chiefs would appear to have been directed to their increase rather than diminution; but the period when such a system could have been useful has passed away, and the improvement or rather formation of roads (for which the nature of the soil offers every facility; indeed in many places cutting through the forest would be sufficient) seems to deserve attention; facility of transport would necessarily quicken commerce, and the increase of frontier duties might more than repay the expenditure that would be incurred. Even in the present state of the roads, the addition of bridges would be a material advantage which they now want; in the interior the chasms and valleys that intersect them are often crossed on the trunk of a tree, or a rustic bridge of canes, supported by branches that overhang the stream, affording a dangerous passage.

The natives estimate the greater distances by time, the smaller ones by sound. A *Naly* (something less than half an hour) may be considered as a mile and half in the level country, but in the hilly parts the estimation must be reduced by one-third. A *Vilypaad* (or call) means about a quarter of a mile. The summons is communicated in a peculiar tone of voice, enforced by the utmost effort of the lungs, and answered after the same manner: to the woodiness must be attributed the generality of this practice, and to the same cause is probably ascribable the practical knowledge of the compass possessed by every one, and employed upon the most trifling occasions*.

*Memoir of the survey of the Travancore and Cochin States by Lieutenants Ward and Conner page 57.

Much of the commerce was conveyed by bullocks and donkeys. Several good roads and water communications were opened during the reign of Marthanda Varma. The canal which connects the backwaters of Quilon and Kayamkulam through Chavara and Panmana was constructed at this time. The Paravur canal was also opened during his reign. Fra Barthalomeo records that during Rama Varma's reign (1758-98), there was a beautiful road connecting Cape Comorin with Kodungallur (Cranganore), which was provided with watersheds and inns at convenient places throughout its entire length.

The attempts at improvement of communication in the High Ranges deserve particular mention. In 1840 Ward and Conner undertook a survey of the region and made the outside world aware of the possibilities of its development. A feature of the communication system then prevailing in the High Ranges was the large net-work of elephant tracks. It may be noted that elephants are reckoned among the finest road makers in the world and the labrythine ways laid out by these intelligent beasts from time immemorial have helped the early English pioneers a great deal in planning successfully the modern system of road communication in the High Ranges. General Hamilton of the Madras Army followed the course of such tracks and ascended the Anamudi Peak in May 1862. The present Northern Outlet Road from Munnar to Udumalpet and several others were traced by a pioneer by name Col. Valentine by following the course of elephant tracks.

The K.D.H.P. Company started in 1897 played a leading part in improving the system of transport and communication in the High Ranges. In 1899 L. Davidson, General Manager of the K.D.H.P. Company set about the construction of the Kundalay Valley Road from Munnar to Top Station. It extended over a distance of 4 kms. from Bottom Station to Top Station. Moreover, in 1900 the first ropeway planned by Davidson and constructed by Gideon and William Kemlo was opened. In the meantime the Kotagudi—Bodi road was laid and tea was transported in bullock carts to Kodaikanal Road Station and from there by rail to Tuticorin. A mono-rail train line from Munnar to Top Station was also erected and later it was replaced by a light railway running on a 61 centimetres line (35.42 Kms.). This took place in the first decade of this century. It may be noted that the rail line has since become defunct, the floods of 1924 having caused untold damage to it.

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In wake of the damage to the rail line the Kundalay Valley Rope way from Munnar to Top Station was opened in December 1926. It was 23.33 kms. long. In 1930 a new ropeway from Top Station to Bodinayakannur was surveyed but this project was abandoned. A new ropeway from Top Station to Kotagudi was however constructed.

In the Malabar region road construction received an impetus with the invasion of Haider Ali and his son Tippu Sultan; the latter in particular pioneered the laying of gun-roads to further his policy of aggrandisement. Tippu among the earlier rulers clearly recognised the need for effective communications and his efforts won the plaudits of the East India Company administrators who pursued him to Malabar. One of whom, Col. Dow in a minute on the State of Roads in 1796, observed: "Tippu projected and in a great part finished an extensive chain of roads that connected all the principal places in Malabar and pervaded the wildest parts of the country ....This was the most politic and enlightened of any enterprise undertaken by that prince, and he appears to have been sensible about the construction of the public roads was absolutely necessary for the maintenance of his authority".

This was followed by a lull in activity: "Many works of utility have been abandoned since the province came into the hands of the Company. .. ..the roads have been gradually encroached on and in many parts entirely shut up."

Great strides were made in expanding the road net-work as the Nineteenth century progressed. In the three different regions of Kerala viz., Travancore, Cochin and Malabar, there began to surface though in an unco-ordinated manner the infrastructure of a modern State such as a system of Public Works and Communication. For the first time a conscious effort at establishing a smoothly functioning road system was in the evidence. The British especially linked Malabar with the rest of the province of Madras by wide well kept roads shaded by banyan trees as a part of securing strategic military control.

Road Transport

National and State Highways: Their mileage, Condition and Maintenance

Considerable advance in constructing the Transport and Commnuication infrastructure has been achieved in Kerala. The length of roads in Kerala is 1.09 lakh kilometres which

works out to 28 kilometres per 100 sq. km. of area. This is the highest ratio of roads to area of any State in India. All the villages in the State are connected by interstate roads. The net-work of roads comprises roads maintained by National Highways, Public Works Departments, Municipalities, Corporations, Panchayats, Forests and other Departments. The table below gives the length of roads in 1985-86.

TABLE—I

		Length in kms.
1.	National Highway	836
2.	Public Works	19,460
3.	Panchayats	81,539
4.	Municipalities including Corporations	4,639
5.	Forests	1,674
6.	Others	600
	Total:	108.748

The Central Government is directly responsible for the National Highway system. Of the total length of 836 km. of National Highway (N. H.) the portion of N. H. 47 covering 417 kms. and a portion of N. H. 17 covering a length of 419 kilometres form the National Highways in Kerala State. The National Highway passes through the coastal belt of Kerala. N. H. 47 enters Kerala at Walayar, passes through Palghat, Trichur, Ernakulam, Alleppey, Quilon and Trivandrum Districts and leaves off at Parassala. N. H. 17 (formerly known as the West Coast road) enters Kerala at Talapady and after passing through Cannanore, Calicut, Kuttippuram, Cranganur, it joins N. H. 47 at Edappally in Ernakulam District.

The National Highway is a direct link along the coast from Bombay to Kanyakumari. In Kerala the National Highway traverses through a number of important towns and cities in Kerala, necessitating the construction of fairly long bye

passes to ease the traffic congestion at certain points. The byepasses are as follows:

TABLE II

	Name of byepass	Length in kms
1.	Chalakudy	4.76
2.	Cochin	16.68
3.	Alleppey	6.80
4.	Quilon	13.82
5.	Trivandrum-Neyyattinkara	43.00
6.	Calicut	28.12
7.	Tellicherry-Mahe	16.16
	Total	129.34

The currently accepted standards in the country for length of roads were evolved at the second conference of the Chief Engineers of States held at Bombay in 1959, popularly referred to as the "Bombay Plan". Keeping in view the general economic progress anticipated in the country in the succeeding decade (1961-81) certain criteria to be fulfilled in 1981, were laid down as a programme of implementation. The road length to be achieved was fixed at 32 kilometres per 100 sq. kilometres of area and 155 kilometres per lakh of population. Viewed against this yardstick, the roads maintained by various agencies is 19,460 kilometres, which works out to 50 km. per 100 sq. kilometres of area and 71 kilometres per lakh of population. Thus while the State achieved the all India target of 32 kilometres per 100 sq. kilometres of area the achievement was below the target per lakh of population suggested in the Bombay Plan. The surface-wise length of P.W.D. roads category-wise as on March 31, 1986 is given below:

	Category	Cement concrete	Black topped	Water bound Macadam	Others	Total
1.	State Highways	22	1,985	13	..	2,020
2.	Major District Roads	8	5,747	114	35	5,904
3	Other District Roads	..	7,001	685	1,187	8,873
4.	Village Roads	..	499	332	1,932	2,663
	Total	30	15,232	1,144	3,054	19,460

The road net work in the State is maintained by the P.W.D. (Buildings & Roads Wing), which has split itself into 15 divisions for this purpose. The major road under the State Highway viz., the Main Central Road goes through the midlands of Kerala. Nearly 80% of the roads maintained by the department are black topped and concrete roads. However, of the total length of 81,539 kms. of Panchayat roads only 5,256 kms. (6.4%) are black topped and metalled. The majority of these roads are earthen. Passenger buses ply on many of these roads. Unlike other States where railways play a dominant role, the road system is the most important mode of transport in Kerala, because of topographical limitations viz., presence of the Western Ghats on the eastern boundary. The traffic density in some of the road routes has exceeded 10,000 P. C. U's* per day, which is the limit for a two lane road. (*Passenger Car Units).

Though the road system is fairly developed many of the roads in the State were formed before the introduction of modern fast moving and heavy vehicles and consequently suffer from small width, acute bends and curves, steep gradients, narrow bridges and poor sight distance. The dust free surface is about 25% of the total length as compared to 40% at the national level. The roads maintained by local authorities particularly the Panchayats stand in need of vast improvement if they are to satisfy modern criteria of roads.

Topographical conditions, ribbon development and very high incidence of rainfall pose several problems in the construction, improvement and maintenance of roads in Kerala. The constantly increasing volume of traffic and vehicular density have saturated most of the sections of the national and State highways in Kerala. The successive five years have initiated programmes to improve the condition of existing road works.

The strategy in the Seventh Plan is therefore to improve and upgrade the existing road network. Prime importance is given to complete spillover works, particularly on State Highways and Major District Roads in as short a time as possible. More emphasis is laid on development and improvement than on new construction. The object is to improve the capacity of the existing network. While taking over panchayat roads priority will be given to such roads where the density of vehicular traffic is more or to those which will form missing links in the road system.

With these objectives in view, a road development plan requiring an outlay of Rs. 145 crores for the five years from

1985-1990 has been proposed. Of the outlay of Rs. 145 crores Rs. 25 crores is set apart for the development and improvement of State Highways and Rs. 25 crores for bringing the Major District Roads to proper standards. For the development of other District Roads an amount of Rs. 30 crores is proposed. About 30 per cent of the total outlay (Rs. 41 crores) is provided for taking up village road works under the Minimum Needs Programme. This includes provision for the improvement of panchayat roads, taken over in the past, to Other District Road standards For improvement of roads under Tribal and Harijan settlement a sum of Rs. 14.5 crores is proposed. Other schemes such as railway safety works, roads of economic importance, machinery and equipment and research programme are also proposed in the Seventh Plan.

Vehicles and Conveyances

In the early periods wheeled and pack bullock traffic were unfamiliar. Country boats were commonly used for transport and communication purposes. A change occurred during the second half of the nineteenth century in the wake of road construction activity. A large number of carts made their appearance on the roads of the State, carrying not only goods but also passengers. Though their number has considerably decreased with the advent of motorised transport they are still used for conveying goods between marketing centres. These non-mechanised transport comprised chiefly of bullock carts and horse drawn carriages and had only a limited range of operation in regard to both the area covered and the number of persons and volume carried.

In Travancore the first motor vehicle was registered in 1912. The new form of transport came into increased use for public transport only in the second decade of the present century and with it, surface transport entered a new phase. Conditions radically changed after World War-I 1914-18, when the surplus military vehicles were put on the roads in large numbers. The pace at which goods and passengers came to be transported by road took even the Government by surprise. Fare cutting and poorly maintained vehicles created serious problems of competition and safety on roads. Legislation had to be introduced in an effort to introduce some form of regulation and control. The remarkable ease with which motor vehicles reached parts of the country which had seldom seen even bullock carts from outside except at infrequent interval of fairs, festivals or market days, helped to accelerate the pace of the change. By the thirties the all pervasive motor vehicle had transformed the scene.

The Government of India Act, 1935 made provision for Central legislation by including "mechanically propelled vehicles" in the concurrent list. Uniformity in dealing with motor vehicles was sought to be achieved by passing the Motor Vehicles Act of 1939 in accordance with which rules were framed thereunder by the State (Provincial) Governments. Modelled on the English Acts, the Act provided for the creation of Regional and Provincial Transport Authorities with full powers to grant permits to "stage carriages" (buses), "public carriers" (public good vehicle owners), and "private carriers" (owners of goods vehicles carrying their own goods), etc., and to lay down conditions (routes, timings, specifications of vehicles, standards of maintenance, etc.,) and which the permit holders must operate. An important provision gave independent powers for all practical purposes to Provincial and Regional Transport Authorities who were not subject to the direction of the State Governments in regard to their decisions on the issue of permit. Under the Act, State Governments were empowered to prohibit or restrict conditionally by notification in the State Gazette, the conveying of long distance goods traffic by road or of specific classes of goods by private or public carriers with the object of promoting co-ordination of road and rail transport. The regulatory restrictions under the Motor Vehicles Act were later to be embodied in the "Code of Principles and Practices in the Regulation of Motor Transport" and circulated to State Governments for adoption in 1950.

Motor transportation suffered a setback during World War II. The private operators were faced with numerous difficulties, such as stoppage practically of the imports of spare parts as a result of which their prices rose to abnormal levels and the restrictions imposed on the amount of petrol that could be consumed. The available trucks were practically requisitioned by Government and they were driven by producer-gas to the maximum extent possible.

The proper index of progress of motor transportation is the number of motor vehicles operating in the country from year to year. Unfortunately, there is no information prior to 1925 and in respect of the number of vehicles operating in later years upto 1947.

In 1957-58, the number of vehicles was 15,125. The number of motor vehicles registered in the State was 3.62 lakhs in 1985-86, as against 49,208 in 1966-67. The steady growth of motor vehicles during the last decade is shown in table IV.

TABLE IV

Growth of Motor Vehicles during 1970-1986

Type of Vehicles	As on 31st March								
	1970	1975	1980	1981	1982	1983	1984	1985	1986
1. Goods Vehicles:									
(i) Four Wheelers and above	..	..	20,128	22,896	25.696	29,153	30,966	36,699	40,398
(ii) Three Wheelers including Tempos	2,458	15,875.	993	1.786	2,038	2,532	2,392	4,170	4,927
2. Buses:									
(i) Stage Carriages	6,018	..	8,705	9.159	9,765	10.781	11,735	12,910	13,497
(ii) Contract Carriages/ Omni Bus	..	7,828	842	1,041	1,265	1,539	1,912	2.324	2,652
3. Cars and Station Wagons:									
(i) Car	30,841	44,497	54,381	56.802	60,412	64,147	68,511	75,741	82,222
(ii) Station Wagon	..	..	196	236	302	370	484	507	664
(iii) Taxi Car	8,115	11,525	17,780	18,960	21,569	23,763	25,597	28,189	30,201
(iv) Jeep	4,300	5,859	7.023	7,834	9,030	10.110	11.839	12,971	14,721

4. Three Wheelers:									
(i) Autorickshaw	969	..	7,397	9,640	12,727	15,045	17,724	24,383	30,537
(ii) Motorised Cycle/ Rickshaw	..	3,125	38	42	44	49	52	54	55
5. Two Wheelers:									
(i) Motorised Cycle	—	—	58	70	74	70	71	73	73
(ii) Scooter/Motor Cycle	12,860	25,769	50,943	59.531	70,498	81,838	96,478	111,629	130,992
6. Trailers Tractors Articulated	..	—	18,604	1,853	1.946	1,975	2,006	2,104	2,236
7. Tractor	..	—	1,892	2,146	2.226	2,344	2,641	3,089	3,268
8. Tiller	..	—	469	530	793	827	964	1,118	1,214
9. Trailer	1,650	2.735	260	285	328	334	369	426	441
10. Others	..	2,507	1,735	1.786	2,050	2,046	2,339	2,891	3,219
Total:	..	78.168	174,704	194,597	220.733	246,923	276,981	319.259	361,617
Percentage of increase over the previous year:	..	..	13.01	11 39	11.47	11.87	12.17	15.26	13.27

Source : Motor Vehicles Department

The density of motor vehicles in Kerala is high compared to most of the States in India. Kerala had 927 vehicles per hundred sq. km. of area and 1,340 vehicles per lakh of population during 1985-86. The corresponding all India figure during 1984-85 were 261 and 1,153 respectively. Categorywise analysis of motor vehicles in the State indicates that out of 3.62 lakh motor vehicles, scooters/motor cycles constitute more than 36%, goods vehicles 13%, buses 5% and other vehicles 11%. The number of vehicles newly registered in the State rose by 15% from 32,363 in 1984-85 to 37,979 in 1985-86. About 49% of the newly registered vehicles were scooters/motor vehicles, 8.8% were goods vehicles, 3.8% buses, 21.3% cars and station wagons (including taxi and jeep) and 17% others. Among the districts of Kerala, Ernakulam has the largest number of vehicles 59,611, Trivandrum district with 57,258 vehicles comes next. All other districts except Idukki, Wynad and Kasaragod have more than 10,000 vehicles. While comparing vehicle density with road length it could be seen that growth in road length has not kept pace with the growth in motor vehicles. An example is given below.

TABLE V

Comparison of increase in Road length (PWD) and Registered Motor Vehicles during 1980-1986

District	*Increase in road length during 1980 to 1986*	*Increase in Registered Motor vehicles during 1980-86*
Malappuram	402	10,042
Idukki	301	3,875
Palghat	237	9,183
Kottayam	212	10,190
Trivandrum	115	26,122
Trichur	105	19,981
Ernakulam	80	28,861

The movement of motor vehicles in the State is regulated by the State Transport Authority at the State level and the Regional Transport Authorities at the District Level. The Motor Vehicles Department is the implementing medium, which administers the Motor Vehicles Act 1939 (Central Act IV of 1939) and the Kerala Motor Vehicles Rules 1961, and the Motor Vehicles Taxation Act 1976 (Act 19 of 1976) and the rules made thereunder. In addition, all matters relating to inter-state operation of Transport vehicles and state with reference to the operation of tourist taxis and tourist omni buses are dealt with by the State Transport Authority.

There is a State Transport Appellate Tribunal at Ernakulam, which is the Appellate and Revisional Authority to decide disputes arising out of the implementation of the Motor Vehicles Act 1939. The Registering of Motor Vehicles and the issue of licences for drivers and conductors are done at the district level.

Public Transport

Kerala can boast of one of the earliest enterprise in State Transport undertaking which began operating fifty years ago. The raison d' etre for this laudable venture is well summed up by the Travancore State Manual*. "The Government had for some time past been alive to the fundamental defects of the existing system of transport which was mainly controlled by private agencies and individuals. Owing to cut-throat competition among these agencies, each endeavouring to oust the other and to appropriate the profits to itself, the system had been thoroughly demoralised. There was unnecessary waste of capital by running more buses on the routes than was necessary to meet the requirements of the travelling public. The Government was convinced that transport was a fundamental and supremely national need. In pursuance of this declared policy the Government issued a communique on the subject on the 20th of October 1936, laying out the main principles underlying the scheme and emphasising that "it is the duty as well as the right of Government to take into its own hands the control and regulation of public conveyances along the main trunk road and in other selected localities in the State and to improve and organise water borne traffic".

Shortly after, a committee designated the Transport Reorganisation Committee was constituted and that committee resolved that an expert should be appointed to work out, the transport scheme.

*T. K. Velu Pillay. Vol. III, pp. 495-496 which is reproduced here for the benefit of readers.

Accordingly, Mr. E. G. Salter who was the Assistant Operating Superintendent of the London Passenger Transport Board, which is the biggest transport undertaking in the world, was appointed as the Superintendent of Transport and a new department named the State Transport Department was organised. Mr. Salter arrived at Trivandrum on the 20th of September 1937 and assumed charge of his office immediately.

Soon after, sixty Commer Chasis fitted with Perkins Diesel engines were got down from England and these were erected by the mechanical staff of the department under the close supervision and guidance of the Superintendent. An experimental body was designed by the Superintendent with the co-operation of the Superintendent of the Workshops and this served as a model for building bodies for the remaining chasis. It may be mentioned in this connection that the bodies were built by local workmen using local materials excepting glass and sheet iron.

The selection of the operating staff deserves mention in this connection. Drivers were selected exclusively from among those who were working on the Trivandrum-Cape route and were likely to be thrown out of employment owing to the introduction of the scheme. The policy of the department to entertain men with educational qualifications as conductors helped to solve to a certain extent the problem of educated unemployment in the State, for more than one hundred graduates had been entertained as conductors and inspectors.

The State Motor Service was inaugurated by His Highness the Maharaja on the 20th February, 1938/19th Kumbham 1113 M. E. when a distinguished gathering of many hundreds of specially invited guests, official and non-official, assembled in the temporary garage building at Thampanur.

The sections first covered by the vehicles of the Department were Trivandrum-Nagercoil, Trivandrum-Neyyattinkara, Nagercoil-Colachel and Nagercoil-Cape Comorin. Service within the municipal limits of Trivandrum with an extension to Nedumangad was taken up in the next month. Three months later the Quilon-Trivandrum line was also taken up. All transport services by private concerns were prohibited on the routes served by the departmental buses. Regular service for the transport of goods from the High Ranges via Alwaye was also taken up by the Department. In Meenam 1115 (March 1941) the State Transport line was extended to Kottayam.

It was under the control of an officer designated the Superintendent of Transport.

Reviewing its functioning, the Travancore State Manual (Vol. III) observed thus: "In the very short time during which the service has been in operation, it has shown perceptible signs of an unqualified success. This does not merely consist in the profits that the Government is making out of the concern but also in the matter of better facilities offered to the travelling public. The saloon bodied buses with rear entrance and gangway in the middle, with first class seats upholstered in leather, accommodate 23 persons each in the maximum of comfort. The buses depart and arrive at scheduled timings. A time table detailing the services between various centres and a table of fares over the various sections has been printed and published for the guidance of the public. A parcel service has been introduced in conjunction with the passenger service. By this arrangement people can send goods to the various places on the route through agents appointed by the department, who receive and transmit parcels from consignors and distribute them to the consignees in their localities. This is a new feature in bus service which would prove of very great help to business-men and the public at large. It may be mentioned here that in order to facilitate the working of the parcel service the crew of a bus has been increased to three by the addition of a parcel clerk, and the conductors who were previously working in the line have been mostly absorbed in this capacity".

The nationalised transport services first introduced in Travancore in the year 1938 was progressively extended year after year. Express bus services linking Trivandrum to Cape Comorin, Quilon, Alleppey, Kottayam & Alwaye were operated. Following integration of Travancore and Cochin the nationalised transport system was extended to the Cochin area. A through mail service from Trivandrum to Ernakulam commenced. In most of the routes so nationalised, the private sector had not been completely eliminated since restricted overlaps were allowed to them here and there. A scheme of progressive rehabilitation of existing services with a view to serving the travelling public in a larger measure was started. There was an increase in the number and frequency of services operated in every routes. New constructions like waiting sheds for the travelling public, workshops and garages for the buses were constructed. With the formation of the Kerala State, the nationalised transport services were extended to the Malabar region.

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*Travancore State Manual, T. K. Velu Pillai, Vol. III, P. 497.

During 1960-61 some important bridges in the National Highways were opened for traffic and the extension of nationalised services beyond Aroor upto Trichur was sanctioned. The Department also introduced in due course a new type of cheap and quick means of transport viz., the Fast Passenger services. These fast passenger services are now operating round the clock mostly along the trunk roads of the State. The long distance services with route distances extending in some cases upto 350 kilometres or beyond have helped to provide greater amenities to the travelling public. And further, unlike the private sector, the State Transport undertaking with its extensive net work of services offers to the travelling public a co-ordinated and reliable transport system with linking facilities in all directions and at all times.

The Kerala State Road Transport Corporation

The Kerala State Road Transport Corporation (K.S.R.T.C.) took over the services run by the Kerala State Transport Department with effect from 1-4-1965. At the end of the Third Plan, the Corporation had a fleet strength of 1015 vehicles (925 buses, 53 lorries and 37 other vehicles). The total number of seats at the end of the Third Plan was 40,524.

The operating fleet of the Kerala State Road Transport Corporation at the end of 1970-71 consisted of 1561 buses, 28 lorries and 67 other vehicles making a total of 1656 vehicles. The number of routes operated in 1970-71 was 1262 and the gross distance operated 1060.66 lakhs km. The average earning per vehicle on road during that year was Rs. 273. The revenue receipts of the Corporation in 1970-71 was of the order of Rs. 12.25 crores.

The Kerala State Road Transport Corporation (K.S.R.T.C.) had a fleet of 3070 buses as on 31st March, 1986 compared to 3239 in the preceding year. The Corporation scrapped 283 buses during the year, but added only 114 buses. However the number of schedules operated by them increased marginally from 3075 in 1984-85 to 3089 in 1985-86. The number of routes under operation also increased from 3804 in 1984-85 to 3819 in 1985-86, the total route distance increasing correspondingly from 170,514 kms. to 171,473 kms.

The operational statistics of K.S.R.T.C. reveals that even though there was a fall in the fleet strength (5 per cent) passengers carried by them has not decreased proportionately. As given in the table the total number of passengers carried by K.S.R.T.C. decreased from 7353.96 lakhs to 7349.65 lakhs only (0.05 per cent).

TABLE VI

Kerala State Road Transport Corporation—Operational Statistics and Operational Ratios—1985-86

Sl. *No.*	*Particulars*	*No.*
1	No. of Buses as on 31-12-1986	3,070
2	No.of schedules as on 31-3-1986	3,089
3	No. of Routes	3,819
4	Route distance in Kms.	17,473
5	Gross Kilometre Operated (in lakhs)	2,318.37
6	Effective Kilometre Operated (lakhs)	2,302.94
7	Passengers Carried (lakhs)	7,349.41

The district-wise distribution of Transport Units in K.S.R.T.C. showed that Trivandrum district alone has twelve transport units located at different areas in the district. The total number of buses held by these units was 975 which is 34 per cent of the total buses held by K.S.R.T.C., Alleppey was second with 282 buses. Kasaragod has the lowest number of buses at 15.

The Gross Revenue earnings of the Corporation increased by about 4.6 per cent from Rs. 96.75 crores in 1984-85 to Rs. 101.19 crores in 1985-86. The basic fare structure of all

types of services in K.S.R.T.C. was revised upwards during this period but the minimum fare remained unchanged. Also, students, who formed about 6 per cent of the total passengers carried during this period were exempted from paying the revised fares. The gross revenue earnings did not therefore show appreciable increase. The fare structure of K.S.R.T.C. which came into effect from 15-4-1985 in various types of services is given below:

TABLE VII

Type of services	*Basic fare Km. (Ps.)*	*Minimum fare (Ps.)*
City	9	40
Ordinary	9	50
Fast Passenger	11	100
Express	12	300

The average earnings per passenger as well as the average earnings per km. of buses operated increased during the period. The average earnings per passenger increased from 129 paise in 1984-85 to 136 paise in 1985-86. The average earnings per km. of buses operated (EP km.) increased from 398 Ps. to 443 Ps. respectively, an increase in the fleet, the effective km. though there was reduction in the fleet, the effective km. operated was not affected very much. The earnings per vehicle on road per day increased by about 13 per cent, from Rs. 1068.27 in 1984-85 to 1210 in 1985-86.

The Gross expenditure of K.S.R.T.C. during the period under review showed an increase of 6 per cent, from Rs. 115.04 crores in 1984-85 to Rs. 121.85 crores in 1985-86. Expenditure on fuel decreased by 7.5 per cent to Rs. 24.41 crores, while on staff, the upward trend continued.

The total loss of the Corporation for the year 1985-86 amounted to Rs. 19.85 crores which was Rs. 21.56 crores in 1984-85. This shows 8 per cent reduction in the loss incurred in 1985-86. The accumulated loss of the Corporation came

down from Rs. 102.03 crores in 1984-85 to Rs. 84.11 crores in 1985-86. This was because of the writing off of Rs. 37.77 crores due to Government in 1986. The total amount written off by the Government during 1980-85 works out to about Rs. 65 crores. (Rs. 19.44 crores in 1980-81, Rs. 7.70 crores in 1983-84 and Rs. 37.90 crores in 1985-86). Of the total capital investment in the K.S.R.T.C. the share of the Government of Kerala was Rs. 33.42 crores and that of Government of India, Ministry of Transport was Rs. 15.20 crores and loans outstanding Rs. 26.26 crores.

Vehicle productivity, an important aspect of operational efficiency, largely depends on the age and composition of the fleet. At the all India level the percentage of over aged buses in the total public transport bus fleet was about 15 per cent against a little over 42 per cent in K.S.R.T.C. Breakdowns and cancellations and restricted operations resulted in lower vehicle productivity. The utilisation of fleet in the public transport undertakings on an average in India was 82.5 per cent whereas it was only 75.34 per cent in K.S.R.T.C. The fall in the fleet utilisation was mainly due to the large proportion of over aged buses.

Another important factor to be considered is the staff productivity and the expenditure on staff. As indicated in the study on the performance of State Road Transport Undertakings by the Planning Commission, the staff cost per bus km. among the States in India during 1984-85 was highest in the case of K.S.R.T.C. The staff strength of the K.S.R.T.C. was 32217 i.e., about 10.4 per schedule during the year under review.

The operational statistics of the K.S.R.T.C. reveals that even though there has been an increase in the Gross revenue earnings due to increase in the basic fare and better utilisation of the fleet, the Gross expenditure showed a more than proportionate increase.

An Association of State Road Transport Undertakings set up in 1963, co-ordinates the activities of the State Transport undertakings and helps to secure procedural uniformity, higher standards of service and economic operation.

Passenger Transport

The passenger transport operations by road are carried out both by the public and private sector operators in the

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State. The K.S.R.T.C accounts for only about a third of the total Stage Carrier fleet. The district-wise distribution of Stage carriages in the state is given in the table below:

TABLE VIII

Distribution Of Stage Carriages in the State

	Districts	K.S.R.T.C. Number of Transport Units	K.S.R.T.C. Number of buses held in the unit	Other 2 Stage Carriages	Total Stage Carriages
1.	Trivandrum	12	975	191	1,166
2.	Quilon	3	238	688	926
3.	Pathanamthitta	2	101	384	485
4.	Idukki	1	23	293	316
5.	Alleppey	4	282	506	788
6.	Kottayam	6	266	745	1,011
7.	Ernakulam	5	251	1,355	1,606
8.	Trichur	4	152	1,303	1,455
9.	Palghat	1	87	705	792
10.	Malappuram	3	77	734	811
11.	Calicut	1	100	1,053	1,153
12.	Wynad	1	168	55	223
13.	Cannanore	2	108	997	1,105
14.	Kasaragod	1	15	316	331
	Total:	46	2,843	9,325	12,168

According to the registration figures provided by the Transport commissioner's office, the number of stage Carriages registered in the State increased from 12,910 in 1984-85 to 13,497 during 1985-86. The increase has been entirely in the private sector. As can be seen from the table this sector is predominant in most of the districts particularly

in the north. The distribution of stage carriages among the districts indicate that it is more or less in the population proportion and wherever the K.S.R.T.C. is not adequately represented, the private sector is present noticeably. These buses operate in all the districts of the State.

TABLE IX

Number of Bus Routes in force as on 31st March 1987 (Private Sector)

Sl. No.	District	Type of route	Total number of bus routes in force at the end of the year	
			City/Town	Others
1.	Trivandrum	Short (upto 40 km.)	69	75
		Medium (40-80 km)	60	43
		Long (above 80 km.)	..	..
2.	Quilon	Short (upto 40 kms.)	102	54
		Medium (40-80 kms.)	..	240
		Long (above 80 kms.)	..	19
3.	Alleppey	Short (upto 40 kms.)	25	134
		Medium (40-80 kms.)	..	86
		Long (above 80 kms.)	..	2
4.	Kottayam	Short (upto 40 kms.)	99	156
		Medium (40-80 kms.)	..	123
		Long (above 80 kms.)	..	9
5.	Idukki	Short (upto 40 kms.)	..	53
		Medium (40-80 kms.)	..	70
		Long (above 80 kms.)	..	115
6.	Ernakulam	Short (upto 40 kms.)	367	190
		Medium (40-80 kms.)	37	109
		Long (above 80 kms.)	..	35

7.	Trichur	Short (upto 40 kms.)	48	430
		Medium (40-80 kms.)	..	144
		Long (above 80 kms.)	..	19
8.	Palghat	Short (upto 40 kms.)	45	116
		Medium (40-80 kms.)	3	353
		Long (above 80 kms.)	..	75
9.	Malappuram	Short (upto 40 kms.)	4	268
		Medium (40-80 kms.)	..	375
		Long (above 80 kms.)	..	188
10.	Cannanore	Short (upto 40 kms.)	106	257
		Medium (40-80 kms.)	..	311
		Long (above 80 kms.)	..	329
11.	Kozhikode	Short (upto 40 kms.)	270	311
		Medium (40-80 kms.)	65	386
		Long (above 80 kms.)	..	9
12.	Wyanad	Short (upto 40 kms.)	..	75
		Medium (40-80 kms.)	..	3
		Long (above 80 kms.)	..	5
13.	Pathanam-thitta	Short (upto 40 kms.)	..	..
		Medium (40-80 kms.)	..	370
		Long above (80 kms.)	..	..
	Total:	Short (upto 40 kms.)	1153	2093
		Medium (40 kms.)	165	2476
		Long above (80 kms.)	..	1234
	Grand Total:		1318	5803

Source: Motor Vehicles Department.

Goods Transport

Goods transport by road is mostly with the private sector. Essential data on the volume of goods and other operational statistics relating to goods transport operations by roads are not available on a regular basis. The registration figures of

goods vehicles are the only indicators at present to assess their growth. Registration of goods vehicles has shown considerable increase during the last two decades. The goods vehicles (4 wheelers and above) increased from 36,699 as on 31-3-1985 to 45,325 as on 31-3-1986, shows an increase of 24 per cent.

TABLE X

Growth of Goods Vehicles in Kerala During the last two decades

As at the end of the year	*Number of goods vehicles*	*Index*
1966	8,848	100
1975	15,875	179
1980	20,128	227
1981	22,896	259
1982	25,696	290
1983	29,153	329
1984	30,966	350
1985	36.699	415
1986	45,325	512

National Permit Scheme

Goods transport is almost exclusively in the Private Sector. For removal of constraints on the movement of goods by Road Transport, a scheme of national permits for public carriers was introduced in 1975. Under the scheme Government has specified the number of national permits each State/Union Territory can issue. The maximum number of permits to be issued initially was fixed at 5,300 which was raised to 8,300 in 1979, 16,600 in 1980, 24,900 in 1982 and now to 32,100.

Details relating to issue of permits granted under National Permits Scheme.

1.	Permits granted under		1985-86
(i)	Existing Inter-State Operators	(Nos.)	184
(ii)	Existing Intra-State Operators	(")	184
(iii)	Ex-army personnel	(„)	2
(iv)	Unemployed Drivers	(„)	...
(v)	Scheduled Caste/Scheduled Tribes		1
	Total:		371

Zonal Permit Scheme

For the implementation of the Zonal Permit Scheme, reciprocal agreements are concluded between various participating states forming a Zone. The deliberations and the agreements are done under the auspices of Inter State Transport Commission (ISTC). The agreements are revised| reviewed as and when necessary.

Inter-state agreement

Bilateral agreements were in force between Kerala and Tamil Nadu, Kerala and Karnataka for the operation of Public Carrier and Private Carrier Goods Vehicles and taxi cars on inter-state routes.

To ensure co-ordination between Central and State policies and operation of different modes of transport, the Government has set up a Transport Development Council. The inter-state Transport Commission, a statutory body is responsible for the development, Co-ordination and regulation of Road Transport Services on Inter State routes. As a result of the efforts made by the commission, almost all the States and Union Territories now have reciprocal arrangements for operation of goods and passenger services on Inter-states routes. They have introduced Zonal permit schemes for the unhindered movement of limited numbers of public goods carriers over the National and State Highways on payment of tax at a single point.

Solatium Fund Authority

In 1982, the Motor Vehicles Act, 1939, was appropriately amended to establish a Solatium Fund for giving Solatium (Compensation) to the Victims of hit and run Motor Vehicle accidents i.e., the accidents arising out of the use of Motor Vehicles, the identity whereof cannot be ascertained inspite of reasonable efforts made. The Solatium payable is Rs. 5,000 in the case of death and Rs. 1,000 in the case of grievous hurt. The Solatium Fund Authority administers the Solatium Fund that has been established with an initial amount of Rs. one crore. This is augmented by contributions from GIC (General Insurance Corporation) plus the Central Government and State Governments in the ratio of 70%, 15% + 15% respectively.

The Solatium Fund Scheme is being implemented through State Governments. The legal heirs of the deceased or the victim of the grievous hurt have to submit his claim to the Tahsildar|Sub Divisional Officer who as a claims Enquiry Officer would quickly process the matter on the basis of first information report and medical report and recommend to the District Magistrate the grant of Solatium.

Licensing of drivers and conductors

There were 11,12,382 driving licence holders as on 31st March 1987 of which 58,463 were newly issued licences during the year. There were 687 recognised driving schools in the State in 1986-87 as against 498 in the previous year.

Tourist taxis

Tourist Permits were issued by the State Transport Authority according to requirements with a view to promoting tourism in the State. There were 6,272 Tourist Permits in the State as on 31-3-1987.

Rail Roads

Logan in the Malabar Manual mentions the opening on 12th May 1862 of the section beyond Podanur, which linked the West coast with the Presidency town i.e., Madras. The

total length of line within the district was ninety-nine miles (160 kilometres) and the following were the railway stations.

1. Calicut
2. Kallayi
3. Ferok
4. Kadalundi
5. Parappanangadi
6. Tanur
7. Tirur
8. Edakkolam
9. Kuttipuram
10. Pallippuram
11. Pattambi
12. Cheruvannur (Shoranore)
13. Ottapalam
14. Lakkidi
15. Mankarai
16. Parali
17. Olavakkot
18. Palghat
19. Kanyikod
20. Valliyar

From 1861 to 1888 the terminus was at Chaliam on the Southern Bank of the Beypore River. The line was extended to Calicut in 1888. In 1901 and the two following years it was opened for traffic as far as Badagara, Tellicherry and Cannanore respectively and in 1907 it reached Mangalore. In 1927, a new line from Shoranur to Nilambur via., Angadipuram—a distance of 4.15 miles (66 kms.)—was opened. The Pollachi-Palghat railway 33.45 miles (54 kms.) was opened for traffic in 1932. A detailed survey was made in 1923-24 for a line from Tellicherry to Nanjangode in Mysore territory with a branch from Peravur to Makkat in Coorg, but owing to the prohibitive cost the proposal was not implemented.

The introduction of railway into Travancore was taken up by the Travancore Government in 1876. After a prolonged correspondence till 1898 the Madras Government ordered a resurvey of the Ghat Section and the Government of India placed the services of Theodore Michell, Executive Engineer,

at the disposal of the South Indian Railway Company to take charge of the survey and construction of the line. Sanction was received from the Secretary of State for India in 1899 to commence work at once and the Government of India granted an allotment of Rs. 7,00,000 for construction work in the British Section. The Travancore Government also advanced Rs. 17 lakhs as soon as the S.I.R. Company had raised debentures on the guarantee of the Government of India—a guarantee which the State also gave as regards the cost of the line passing through Travancore.

Of the total length of the line 50.33 miles (84 kms.) were in British territory and 57.94 (93 kms.) in Travancore. By September 1900 the survey work of the whole route was finished and construction begun. Through communication from Quilon to Tinnevelly was opened on the 26th November 1904. The original estimate for the line was Rs. 1,01,62,018 for 103.38 miles (175 kms.) but this had increased considerably, the actual amount spent being Rs. 1,57,71,766 for 108.27 miles, (185 kms.) Rs. 45,06,129 for the British Section and Rs. 1,12,65,637 for the State Section.

The railway runs over a difficult tract and the work done on the Ghat Section was pronounced to be exceptionally good. There are five tunnels all of which go through very hard granatoid gneiss. The longest of them is 2,800 ft. From Quilon Station a sliding had been made to the backwater near the Residency.

The Cochin-Shornur Railway passed through certain portions of Travancore. In October 1899 the Travancore Government was requested by the Madras Government to make necessary arrangements to assume the lands within the State required for the purpose and make them over to the Madras Railway authorities who undertook to construct the railway line on behalf of the Cochin Sirkar.

This railway was opened for goods traffic on the 2nd June 1902 and for passenger traffic on the 16th July 1902. The length of the line passing through Travancore territory was only 18 miles. Special arrangements had been made with the approval of the British Government for the protection of the customs revenue of the State by establishing customs houses at Angamaly, Alwaye and Edappally, the three stations in Travancore through which the line passed. This railway was later converted to broadgauge.

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In 1913, the Secretary of State for India sanctioned the extension of the railway from Quilon to Trivandrum. The cost of the extension including rolling stock and compensation for the lands to be acquired were to be met by the State. The extension work was completed in 1917 and the line opened for traffic on January 1, 1918. In 1926 the extension of this line from the Trivandrum beach to Thampanur in the heart of the town was sanctioned and in 1931 the line was opened for traffic.

The introduction of railway into the Cochin State was finalised in 1899 when the scheme for the construction of a narrow gauge line from Shoranur to Ernakulam entirely at the cost of the Cochin Government received the sanction of the Government of India and the construction of the line was started by the Madras Railway Company before the end of the same year. The construction of some of the major bridges presented considerable difficulty and it took nearly three years to complete the work. The line was opened for goods traffic on the 2nd June and for passenger traffic on the 16th, July 1902. The length of the line was 65 miles (105 kms.) of which about 43 miles (72 kms.) ran through the Trichur District. The capital outlay on this railway was Rs. 70 lakhs. The metre-gauge Shoranur-Ernakulam railway was converted into broad gauge in 1930-35 in connection with the development of the Cochin Harbour. The line was extended from Ernakulam to Cochin Harbour on 1st July 1940 with the opening of the Bridge head to pier. Another notable landmark was the formal opening on 17th October 1956 of the Kottayam-Ernakulam line, which facilitated through communications between Ernakulam and Trivandrum via., Quilon.

The Railways in the State come under three divisions-Trivandrum, Palghat and Madurai. The net-work consists of a route length of 504.20 kilometres (broad-gauge) under the Trivandrum Division, 436.21 kilometres under the Palghat Division and 113 kilometres of metre gauge within the State—a total of 1054 kilometres. A number of mail express trains have been introduced to connect various centres of Kerala to other parts of the country. There are now 132 railway stations. About 338 lakhs passengers originated from the stations of the Trivandrum Division during 1985-86. During the same period 137.65 lakh passengers originated from the different stations in Kerala under the Palghat Division. About 1.91 lakh wagons were loaded and 1.61 lakh wagons were received at different stations under the Trivandrum and Palghat Divisions during 1985-86.

To provide adequate infrastructural facilities for the development of backward areas of Alleppey district, the construction of a new broad gauge line from Ernakulam to Alleppey (57.12 km.) was started in 1979. The project was estimated to cost Rs. 45.50 crores. The earth-work of this line has been completed. Construction work of stations at Sherthallai Mararikulam and Thuravoor is in progress.

The Railway Board has already approved the extension of the Ernakulam-Alleppey line to Kayamkulam and the project is estimated to cost Rs. 28 crores. Work on the Guruvayoor-Kuttipuram line is expected to start soon. The doubling of the main trunk route from Palghat to Ernakulam (151·km.) was completed in January 1986.

There are train services from Trivandrum to Cannanore, Mangalore, Ernakulam, Bombay, Madras, Ahamadabad, Jammu-Tawi, Bangalore, Shoranur and Guwhati and Kanyakumari. Likewise Ernakulam is linked with Trichy, Hyderabad and Gorakhpur.

The railway plays a very important part in the socio-economic life of the State. The local agricultural products like coconuts, arecanuts, pepper etc., forest products like timber, tiles, chemical fertilisers, DDT., petroleum products, edible oil etc., which are in great demand all over the country are transported by railway to various parts of India from the State. The area is highly deficit in food grains. In view of the limited cultivable area available and the high density of population, the food grains have to come from distant places like North India and Andhra Pradesh and it is by railway that these are moved into the State. There are also several important fairs and festivals in this State and the devotees who visit these pilgrim centres in their thousands are transported by railway. It may also be mentioned in this connection that competition between railway and road is most intense in those regions of the State which have a net-work of roads running closely parallel to the railway line. Considerable freight is lifted by lorries to points reached by rail, especially from Cochin Harbour Terminus. Recent trends indicate that high rated freight prefer to move by road, leaving low rated one for the railway.

PORTS

There is one major port at Cochin in the State, besides four major intermediate ports at Neendakara, Alleppey, Calicut, Beypore and Vizhinjam and nine minor ports at Trivandrum, Quilon, Kodungallur, Ponnani, Badagara, Tellicherry, Cannanore, Azhikkal and Kasaragode. The administration of the major port is the direct responsibility of the Central Government in the Ministry of Shipping and Transport while minor ports figure in the concurrent list in the constitution and are managed and administered by the State Governments.

Major Port

The major port in the State is Cochin which is administered in accordance with the provisions of the Major Port Trust Act, 1963—by a Board of Trustees representing various interests connected with port operation and the shipping Industry. Cochin is a natural harbour. The traffic handled at this port consists of mainly petroleum products, fertilisers and general cargo.

An early picture of the genesis of the port is lucidly drawn in the contents of a talk broadcast from the Madras Station of All India Radio by Sir R. K. Shanmukham Chetty, a former Dewan of Cochin, in July 1939.

"The Port of Cochin, in view of its beautiful scenery and the lagoons and backwaters, has been named 'The Venice of the East'. Even as Venice is the 'Queen of the Adriatic' so has Cochin become the 'Queen of the Arabian Sea'.

Cochin is the first place touched by a European through the sea-route. The earliest European settlement in India was at this place. The Portuguese Admiral, Cabral landed in the Cochin Harbour in the year 1500. Vasco da Gama followed him in 1502 and died here. The first European building in India was erected here in 1504.

The Cochin Harbour, which is now recognised as the most beautiful harbour in India, lies in a country with such rich historical memories. The development of this modern port is a romance of work and vision. Behind an opening from the sea, which is about 400 yards wide, there is an area of 1920 square kms. of sheltered backwater. In spite of this natural advantage, a rock like barrier of sand between the backwater and the sea prevented Cochin's natural harbour from taking its place as a modern deep sea port. For more than a hundred

years, people have been talking of developing this natural port. It was in 1835 that the first chart was made. But it was not until 1921 that work was really started on this harbour. The great engineering work was finally accomplished by the Harbour Engineer (Sir R. C. Bristow) who for nearly 20 years has laboured on this great enterprise, and with his own hand, is today giving the finishing touches to this magnificent piece of work.

In the process of cutting the sand-bank and dredging the backwater a new island has been formed, comprising nearly 800 acres of valuable property. This island is known as 'Willingdon Island' On this island are situated all the major works of the port; the wharfs, the port railway, the administrative buildings, the Custom House and transit sheds, and last, but not least, the beautiful Malabar Hotel. The future development of Willingdon Island is planned out on a grand and worthy scale. It will be laid out in modern style with broad roads and flowering avenues of trees bordered by buildings artistically planned. Here will be located the offices and shops and business houses. When the projected buildings and other structures are completed, this place will not only be humming with all the hectic activity connected with a modern port, but will be in harmony with the beauty of the natural scenery that surrounds it.

Three Governments are partners in the enterprise connected with the creation of the Cochin Harbour—the Government of India and the Governments of Cochin and Travancore. In the early stages when the port was a minor port, the Madras Government also was one of the partners in the scheme. Since the declaration of the port as a major one, the local Government have withdrawn from this. If the engineering problems connected with the port were formidable, no less easy were the innumerable administrative problems that this partnership gave rise to. After prolonged negotiations which were carried on for many years, the final agreement amongst the Governments concerned was concluded in 1935. The territorial sovereignty of the Cochin Government over the port area is maintained intact, the day-to-day administration of the port is entrusted to a semi-autonomous Port Trust and the three Governments concerned share in the collection of the customs revenue of the port in certain fixed proportions. The three Governments together with the Municipalities of British Cochin, Ernakulam and Mattancheri and the Chamber of

Commerce in the locality, will have adequate representation on the Port Trust. The Port Trust has not, however, been created yet, and the administration is now carried on by an Administrative Officer assisted by an Advisory Board. The net customs duty collected at the port during the year 1937-38 amounted to more than Rs. 100 lakhs. The share of the Cochin Government in the customs revenue was Rs. 25 lakhs, and that of the Government of Travancore Rs. 19 lakhs. The balance is the share of the Government of India. Nearly 800 steamship enter the harbour every year, and about 800,000 tonnes of cargo are loaded and unloaded. The capital outlay of the whole scheme will be just over two crores of rupees.

The last stage of the works connected with this great enterprise is nearing completion and all the works will be finished by the end of this year. The magnificent bridge that connects the mainland with Willingdon Island has been completed. The railway will have its terminus near the wharfs, and the port of Cochin will soon be enjoying all the amenities connected with a modern port. It has a great future. Any ship that passes through the Suez Canal can enter the port even in the roughest weather. Alone, among the harbours on the coast of India, Cochin lies on the direct-sea-route to Australia and the Far East. It opens up a new gateway to the Indian peninsula. Cochin will be obviously the place hereafter to embark and disembark for South India. It has a vast and fertile hinterland which will greatly benefit by this new outlet. It is not merely the Cochin State but the whole of South India that will reap the reward of the courage and enterprise that lie behind this great project. The Cochin Harbour is, therefore, a national asset The development of this port is not, after all. either a new or surprising phenomenon. For, it should not be forgotten that in the early centuries of the Christian era, when India was known to the Western World as a land of untold wealth, when names like Bombay, Karachi and Madras were not yet born, it was the West Coast of the Indian Peninsula that has established intimate contact with Europe and the coast of Africa through the enterprise and energy of its adventurous sailors, battling against the elements of the sea in their tiny crafts. History is simply repeating itself in the modern port of Cochin. To the average European traveller, Kipling has created a picture of India as a land of sacred rivers, splendid tombs, hardy Pathans and the Taj Mahal. The traveller goes north and sees great sights, but he misses something too—the flagrant and warm coconut

groves that fringe the coast of the Arabian Sea, where innumerable canals from the fertile hills lazily find their way to wide lagoons on which, as if in a dream, ply picturesque country boats".

During the year 1941 the major works connected with the development of the harbour were completed. The building of the civil aerodrome begun in that year was also completed. The Harbour Railway was opened for traffic from the 1st October 1940.

Before the Second World War started, there was regular passenger service to and from Marseilles and London. The Bibby Line, the P & O and the B. I. lines used to regularly call at this port.

The Cochin Port has made remarkable progress since independence and dominates all transport activities in Kerala.

As part of the Post-war Development Scheme, the wharf was extended by another berth. By 1951, the Port had four wharf berths capable of accommodating four vessels of 450 ft. in length, in addition to the Boat Train Pier which was meant for passenger ships and as a coal berth, 13 stream moorings in the Mattancherri Channel in the western side and three stream moorings in the Ernakulam Channel in the eastern side. The stream moorings in the Ernakulam Channel were mainly intended for use of oil tankers and the rest for steamers carrying general cargo.

It was at this stage of development that the Five Year Plan works at the Port commenced. Development works costing several crores were taken up at the Port under the Five Year Plans. The major items of development work in the Cochin Port during the plan periods are given below: A separate Coal Berth was constructed in 1952-53 in order to cope with the increasing number of colliers visiting the Port. In 1953-54 two additional Warehouses with a storage area of 63,270 sq. ft. were constructed at a cost of Rs. 7.8 lakhs. Two Oil Tanker Berths were constructed at the Ernakulam channel at a cost of Rs. 17.4 lakhs and they were put into commission in 1956. They are connected through jetties to the shore with pipes leading to the shore installations belonging to the Oil Companies. The pipe line leading to the shore installations was commissioned in 1956. The most important work undertaken during the First and Second Five Year Plan periods was,

however, the provision of four additional wharf berths at an estimated cost of Rs. 224 lakhs on the eastern side of the Willingdon Island facing Ernakulam with a view to coping with the pressure of increased cargo traffic. The new wharf is 2,200 feet long and drawing upto 30 feet with facilities such as cranes, railway tracks, transit sheds, warehouses open cargo stocking space etc. The wharf is served with both metre and broadgauge railway lines. The work on the additional wharf berths commenced in 1955 and all the berths have since been put into commission, the fourth one having been opened in May 1964. A second Coal Berth at an estimated cost of Rs. 13.31 lakhs was constructed during the period 1957-58 and it was put into commission in November 1959. Further, to cope with the increasing shipping an additional 1,000 H. P. Steam Tug for assisting vessels to and from berths was acquired at a cost of Rs. 16 lakhs and put into commission in November 1957.

In 1966 when the Cochin Refineries was established the port augmented its facilities for handling the Crude Oil required by the refineries through the modification of the north tanker jetty and provision of 9.14 metres draft at both jetties. These two tanker jetties are now handling over four million tonnes of Petroleum Oil and Lubricants (POL) which constitute about 75% of the total traffic of the port. The integrated development project of the port of which the oil tanker terminal is a part is the most important development scheme undertaken at Cochin Port since the Commissioning of the Ernakulam wharf in 1964. The new Oil Tanker Terminal commissioned in January, 1984 at a cost of Rs. 13 crores has been conceived and designed to meet the increased requirement of traffic in oil comprising 4.5 million tonnes of Crude Oil exports and 1.5 million tonnes of refined Petroleum Products exports. The terminal is an island berth located about one kilometre north west of existing tanker berths built on 227 tubular piles of 600 mm. inner diameter driven upto 45 metres below water level with thick reinforced concrete decking for the super structure. The berth has a capacity to receive tankers about 1.15 lakh dwt. light loaded to 35 feet draft and carrying about 63,000 tonnes of oil. It can take fully loaded tankers with further deepening of the channel. With the commissioning of the oil terminal a freight saving to the tune of Rs. 6 crores is expected. The other major component of the integrated development project, a deep draught fertilizer berth adjacent to the existing Quay 9 for accommodating bulk vessels of 60,000 dwt. bringing raw materials for the Public Sector

Fertilizers and Chemicals Travancore (FACT) has also been commissioned. The new berth has sophisticated facilities like in built dust control devices for unloading.

Petroleum Oil and Lubricants (POL) and fertilizer account for the bulk of the traffic handled at the port about 87% in 1986-87. Besides the above mentioned items, a variety of traditional and non traditional cargo is handled at the port like Cement, Raw Cashewnuts, Machinery, Hardware, Newsprint, Zinc concentrates Bauxite, Iron and Steel being the major items of imports. On the exports side figure key items such as refined Petroleum Products, Tea, Cashew Kernels, Coir Products, Spices, Timber, Marine Products and Coffee, which constitute about 10% of the country's export earnings. The pride of place of exports is occupied by marine products followed by Cashew Kernels. Many Shipping lines operate regular container services to Cochin and empty containers themselves have become an export commodity with the Public Sector Unit at nearby Aroor manufacturing containers for export. The container traffic through Cochin recorded an impressive 41,463 tonnes in 1985-86. With the commissioning of the transfer Cranes, the container productivity has improved substantially. The Port administration has proposed a Rs. 70 crore development plan.

During the Seventh Plan (1985-1990) schemes which involve strengthening of infrastructural facilities, replacement of Cargo handling equipment and floating craft as also navigational aids have been envisaged. Conversion of Quay 9 into full fledged container berth to be commissioned in 1989-90 and acquisition of containers and container handling equipment are the other features of the improvements sought for.

The total traffic handled by the Cochin Port during its Golden Jubilee Year 1986-87 is nearly 70 tonnes. Of this 59.3 lakhs are imports and the rest exports. This is the highest in the Port's History and shows a rise of over 20% over the previous peak of 57 lakh tonnes. More than 87% of the traffic related to Petroleum Oil and Lubricants and Fertilizers. An analysis of Traffic pattern showed that in the last four decades imports had increased over exports by 757 per cent while the latter has risen by 178 per cent. The buoyancy in imports was because of the industrial development in the vicinity of the port requiring large scale import of Crude Oil, Rock Phosphate and Sulphur. During this period the volume of certain commodities declined while others shot up. Many new commodities

appeared in the manifest while some totally disappeared. The latter was caused by the gradual decline of coastal shipping affecting commodities like coconut, Copra and salt. Dieselisation of railways wiped off the coal traffic and the self-sufficiency in foodgrains and the stoppage of import of rice and wheat were the other causes.

A study conducted by the National Council of Applied Economic Research, New Delhi has estimated that the traffic through Cochin Port will rise to 7.8 million tonnes by 1992-93 and to 9.3 million tonnes by 1995-96.

Intermediate and Minor Ports

The four intermediate Ports at Neendakara, Alleppey, Calicut|Beypore and Vizhinjam and nine minor ports at Trivandrum, Quilon, Kodungalloor, Ponnani, Badagara, Tellicherry, Cannanore, Azhikkal and Kasaragode are lighterage Ports. Many of these Ports have fallen into disuse mainly due to the inadequacy of infrastructure facilities to handle modern vessels efficiently and economically. The diversion of cargo traffic through rail and road has also contributed to the fall in traffic. Out of the 13 minor and intermediate ports only four ports viz., Neendakara, Alleppey, Calicut|Beypore and Azhikkal handled traffic of any significance during the past years. During 1985-86, only 1.12 lakh tonnes of cargo was handled at these ports as against 1.75 lakh tonnes in the previous year. During 1985-86 also only the Ports of Neendakara, Calicut|Beypore, Azhikkal handled any cargo. Neendakara alone accounted for 57 per cent of the total. Thirteen steamers having a tonnage of 77,023 called at these ports during 1985-86 as against ten steamers having a tonnage of 58,871 in the previous year. Again Neendakara and Calicut|Beypore accounted for 92 per cent of the steamers. In addition 367 sailing vessels of 41,705 tonnes also called at these ports during the reference year as against 364 sailing vessels of 43,084 tonnes during 1984-85. The number of crafts registered at these ports during the period 1985-86 was 1083 as against 1322 in the previous year. Of this 60 per cent were registered at Neendakara and Kodungaloor. The revenue earned during 1985-86 from various ports in the State was Rs. 62.07 lakhs compared to Rs. 25.19 lakhs, during the previous year. Details of import and export of principal commodities from intermediate and

minor ports are given in Table XI. Details of Harbour crafts registered at the intermediate and minor ports of Kerala during 1985-86 are shown in Table XII.

TABLE XI

Tonnage of Principal Commodities of Imports and Exports from Intermediate/Minor Ports during 1985-86

Name of Port/Commodities	*Import Quantity (Tonnes)*	*Export Quality (Tonnes)*
(1)	(2)	(3)
1. Neendakara Ilmenite	..	63,414
2. Calicut/Beypore	—	—
Timber	—	10,077
Bricks	..	5,068
Tiles	..	4,710
Cement	9,540	1,964
Miscellaneous Cargo.	2,792	5,486
3. Azhikkal-Timber	..	8,504

TABLE XII

Number of Harbour Crafts Registered at the Intermediate and Minor Ports of Kerala during 1985-86

Sl. No.	*Name of Port*	*Cargo boats including barges*	*Canoes including boats*	*Mechanised Fishing vessels*	*Others*	*Total*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Alleppey	..	..	146	..	146
2	Calicut	9	16	74	1	100
3	Neendakara	..	..	421	—	421
4	Trivandrum	..	..	..	..	..
5	Kovalam/Vizhinjam	..	..	..	..	..
6	Kodungalloor	..	..	231	—	231
7	Ponnani	..	1	5	..	6
8	Badagara	..	..	..	..	..
9	Tellicherry	..	..	12	..	12
10	Cannanore	..	..	4	..	4
11	Azhikkal	6	..	1	..	7
12	Kasaragod	..	51	105	..	156
13	Quilon	..	..	..	..	..
	Total	15	68	999	1	1,083

The State Hydrographic Survey Wing is responsible for carrying out field surveys. This wing has its Headquarters office at Trivandrum and two field unit offices at Quilon and Beypore. They are engaged in the collection of investigation data for the development of various minor ports, fishing harbours and fish landing centres and study the feasibility of improving the existing facilities there. The data is made available to the Harbour Engineering Department who use this for the design of

cargo and fishing harbours in consultation with various Governmental agencies in India such as the Ministry of Transport, Government of India, Engineering Research Institute, Peechi, Government of Kerala and the Central Water and Power Research Station, Pune. Apart from the routine harbour surveys, special surveys before, during and after the dredging works, surveys for channel making etc., have also been carried out by the survey wing at various places. Surveys were conducted in Ports like Neendakara, Azhikkode, Ponnani, Beypore, Azhikkal, Kasaragod, Thalai and Vizhinjam; Survey was also undertaken in Mopla Bay at Cannanore.

The departmental dredgers under the Director of Ports undertook dredging at the Ports of Ponnani, Neendakara and Beypore during 1985-86. Apart from departmental dredging, dredging was also undertaken during the year for Cochin Port Trust, Mangalore Yard of Mazagon Dock Limited, Beaver Estates, Cochin, etc., earning more than Rs. 30 lakhs. Out of the total quantity of 3.499 lakh cubic metre dredged during the year the departmental dredging was only 1.692 lakh cubic metre, the remaining 1.807 lakh cubic metre was on account of dredging undertaken for other agencies mentioned above.

The Harbour Engineering Wing is carrying out the development works of Ports and Fisheries Departments. This wing is in charge of investigation, design and construction of fishing harbours. fish landing centres, cargo harbours and capital repairs and maintenance of all structures of the cargo and fishing harbours. During 1985-86 the department continued the investigation works at Beypore, Azhikkal, Ponnani, Thalai, Mopla Bay and Muthalapozhi. In addition to these, investigations of fish landing centres for traditional fishermen have also been conducted at Chalil Gopalpetta, Vellayil Beach, Kanjangad, Quilandy, Mattummal, Kasaka, Palapetty, Edakkadu, Kottayi, Elathur and Mattul.

THE BACKWATERS

Kerala has an extensive system of backwaters (lakes) which stretches from Trivandrum to Parur in Travancore area and extends through Cochin to Ponnani in the Malabar area. It covers 615 sq. kilometres of which an area of 355 sq. kilometres lies in Travancore. These backwaters are known in Malayalam as *kayal*. The breadth is extremely unequal

expanding into a wide expanse at some places and diminishing to a contracted stream at other places. They run more or less parallel to the sea.

The backwaters have been linked by canals in most places. The whole area is navigable by canoes and steam or motor boats during all the seasons of the year. A narrow strip of land, of a width varying from twelve kilometres to 800 metres separates them from the sea into which they pour the flood waters through several outlets. The bed of the lakes consists generally of a thin layer of soft black mud, incumbent on a fine dark sand. On account of the large volume of freshes received during the monsoons the water is comparatively free from salinity during the rainy season except in the immediate vicinity of the outlets to the sea.

The places where these backwaters meet the sea are called *azhis* or *pozhis*, according as the opening is permanent or temporary. The chief *azhis* are those at Quilon, Kayamkulam and at the mouth of the Periyar. The *pozhis* are in the Veli, the Paravur and the Edava lakes. The flood tides flow over into the lakes and cause the larger of them to rise by an average of about 70 centimetres. The extreme height of this tidal rise is 1 metre, and the current flows at the rate of about 4 kilometres an hour. A graphic description of the picturesque backwaters of the State as given in the Farmers of India, Vol. II, ICAR 1961 is reproduced here for the benefit of the readers. The journey through the backwaters is one of the most pleasant experience of those who travel in Kerala. During the rainy season the lakes are in flood and the passage through them difficult, if not dangerous. But as the rain wears off, and the silver streaks of the moon illuminate the horizon on a cloudless night, the panorama presented to the eye of the traveller, viewing the scene from the deck of his boat, as it glides smoothly along the calm surface of the backwaters, is supremely beautiful. "Myriads of fireflies, with their weird twinkle, light up the coastline, fringed with luxuriant vegetation, while the starry heavens reflected in the blue, limpid water below make the fairy scene complete. The solemn stillness of the night is only ruffled by the splash of the oars or the darting of fish hither and thither, giving occasion for the phosphorescent water to make its glow appear, and lend an additional charm to the already enchanting scene".

The main backwaters in the Travancore area are the Veli Kayal, the Kadinamkulam Kayal, the Anjengo Lake, the Edava

and Nadayara Kayals, the Paravur Kayal, the Ashtamudi Lake, the Kayamkulam Lake, and the Vembanad Lake.

The lakes in Cochin area are Manakkoti, Enamakkal, Chattanad, Cochin and Kaitappula.

The life in the backwaters of Kerala reveals a strange pattern, the like of which cannot be seen in any other part of India. A boat journey from Kottayam to Alleppey will provide a fair sample of the area and its amphibious life. Kottayam is an important assembling centre for plantation products and Alleppey is a distribution outlet for the same. There is therefore, very brisk movement of men and material between these two centres. The whole distance is about 30 kilometres of which about one-third is through canals and the rest through the Vembanad Kayal. Starting from Kottayam the canal passes through the middle of paddy fields which extend as far as the eye can reach on either side, interspersed with coconut palms which are generally planted on the main bunds of the paddy fields. During the rainy season the whole region from Kottayam to Alleppey is one large sheet of water. In the midst of these paddy fields are also small man made islands with houses surrounded by coconut palms and banana. The bunds on either side of the canal are often used by the people as dwelling places. Houses of well-to-do people have walls of timber or stone and roofs of red tiles. The poor people live in mud houses, thatched with palm leaves. All along the canal men, women and children can be seen bathing and washing clothes and utensils. The canal is, therefore, the most important source of domestic water supply for most people living in that area.

The canal is a very busy line of communication. Small boats pushed by men with poles and also motor boats are frequently seen hurrying through carrying men and material. Numerous branch canals take off from the main canal leading to places in the interior. Small bridges are provided at important places to facilitate crossing.

The lake is about sixteen kilometres long. It was also equally broad, but in the last fifty years a large part of the shallower areas has been reclaimed for paddy cultivation. Now boats in the lake go through a wide channel between the broad ring-bunds put up for reclamation. Coconut palms are planted in rows along the bunds adding charm to this nature's beauty

spot. The *kayal* or lake is full of activity. In the morning innumerable small canoes paddled by men can be seen going in all directions casting nets and catching fish. Big cargo boats with their sails spread can be seen speeding in all directions. Frequently motor tugs are also seen towing teams of boats loaded with produce. From all sides come the thud of engines pumping water from the paddy fields. The hazardous operation of paddy cultivation in this region is discussed in detail elsewhere. The whole of the lake region is now laid with overhead electric wires carrying power for pumping out water.

A good number of people eke out their livelihood by catching fish and prawns. Sardines appear in shoals off the seacoast and are caught in large numbers. Prawns and crabs, considered luxuries are available in abundance and along with. Giant frogs are shipped to America where they are regarded as great delicacies and consumed with relish.

The West Coast Canal, as envisaged in olden days, was 460 kms. in length was the main navigable canal interlinking the 3 regions in three erstwhile States of Madras, Cochin and Travancore and was commissioned in stages.

Malabar Area—Madras Province

In 1776 the first artificial canal—Sultans Canal 3.8 km. in length—was constructed by Ali Raja of Cannanore to connect Peruvamba and Thaliparamba rivers.

1822 —The proposal for the canal from Kavvai to Chettuvai was investigated—209 kms.—but dropped.

1845—Mr. Conolly, Collector of Malabar, started construction of Elathur-Kallai canal first, then Tanur Canal to connect Tirur and Kadalundy rivers then Ponnani—Chettuvai canal and then Badagara canal. All these were completed by 1848.

Cochin Area.

1840 to 1850—The Karanchira—Trichur Canal was constructed and Edathuruthi Canal was deepened to provide through traffic between Ernakulam to Trichur. Thevara to Kundannur Canal was taken up to connect Ernakulam with Trippunithura.

1870—Munayam—Thiruvanchikulam Canal was constructed.

Edappilli and Parur Canals were constructed by Tholan, the Namboodiri Chieftain to provide waterways to Thiruvanchikulam for worship at the temple.

Travancore

1860-1880—The idea of connecting the backwaters of Vembanad, Ashtamudi etc., was taken up by Dewan Venkita Rao.

The portion between Chennakara to Trivandrum was first done to effect through traffic from Varkala to Trivandrum.

Then Paravoor Canal was constructed to connect backwaters of Paravoor and Edava.

Quilon Canal came next connecting Paravoor and Ashtamudi lakes.

Then, to connect Ashtamudi lake to Panmana lake, the Chavara canal was constructed.

Next, commercial canal was constructed to connect Alleppey town to the backwaters.

In 1860 Anantha Victoria Marthandan Canal work was started to connect Trivandrum to the Southern most end—Kanyakumari. However the work was completed only between Poovar to Colachal but utilising the Karamana River and its estuary navigation was made possible upto Kovalam from Trivandrum. Thus only a gap of 8 kilometres between Kovalam and Poovar still remained to be done.

Thus, starting from 1766 the chain was completed by 1880 to have through traffic between Travancore, Cochin and Malabar from one end to the other. This route came to be known as the West Coast Canal.

The West Coast Canal System which starts from Hosdurg in the north and ends at Trivandrum in the south, the capital of the State, is 558.4 km. in length, including the uncut portion of 47.5 km. from Azhikkal to Badagara. During its course, it is parallel to the West Coast flanked by the Arabian Sea at a distance varying from 0.4 to 11.3 kms. It joins up a series of natural lagoons and backwaters which are fed by several streams and rivers originating on the Western Ghats, the gaps in between being connected by artificial canals. It flows through

the undermentioned areas and connects practically every district in the State from north to south. In its course at certain points it lies between several taluks of different districts, such as the Vembanad Lake.

This main canal is split up into various reaches, and is known as such, probably because it was existing or commissioned as such previously.

TABLE XIII

1.	Hosdurg to Azhikkal	54.5 km.
2.	Azhikkal to Badagara (including the uncut portion)	47.5 ,,
3.	Badagara to Kadalundy	72.4 ,,
4.	Kadalundy to Ponnani	61.2 ,,
5.	Ponnani to Ala	79.7 ,,
6.	Ala to Cochin	35.4 ,,
7.	Cochin to Alleppey	70.8 ,,
8.	Alleppey to Quilon	74.8 ,,
9.	Quilon to Trivandrum	62.0 ,,
	Total	558.3 km.

Inland Water Transport

Kerala is placed in a very favourable position in regard to inland water transport. The waterways to Kerala connect several minor ports with the major port of Cochin, and a number of industrial units are situated close to them. The state enjoys a regular navigation system because of several west flowing rivers and a coastline interspersed with backwaters. Long before the development of road and railways,the coastal and inland waterways provided the main transport base in Kerala. The canal system, navigable all round the year, extends from Trivandrum in the south to Badagara in the north and is interlinked by backwaters and rivers through artificial canals. The total length of the navigable route in Kerala is 1895 kms. accounting for about

20 per cent of the total inland water route in India. This can be categorised under the following three main heads:

(i) the interior coastal canal system;

(ii) the river navigation system; and

(iii) the inland cross canal system.

The 83 km. long Vembanad lake constitutes the centre of these inland waterways.

The inland waterways in the state are shallow in certain regions even for the vessels which are in use at present. These are unsuitable for carrying heavy vessels which will ultimately be more economical. Through traffic in waterways is therefore hindered. The State's waterways are at present maintained by the irrigation wing of the Public Works Department. Due to paucity of funds this department has not been able to carry out adequate regular maintenance, which is a serious drawback. These waterways which were formerly navigable are now rendered unserviceable for want of proper maintenance. Side erosions and silting have reduced the draft and this has contributed to a reduction in traffic. Side protection works and deepening have not been done in most sections for decades.

The West coast canal, which is the main waterway requires renovation. Land erosion during the rainy season prevents free movement of boats on this waterway. More landing places and jetties and better lighting arrangements are necessary. The existing landing places are not properly maintained. Besides, in the Travancore-Cochin area there is a need for constructing additional link canals in order to connect them with the main canals. For example, the Varkala tunnel which is of 9 metre width and 5 metre height with a draft of 1 metre only is the major bottleneck in the southern region.

In spite of all these limitations the inland water transport system in Kerala carried as much as 4 million tonnes of freight traffic in the year 1970 and 26.6 million passengers in the year 1976. Though there has been a high degree of competition from road and rail, the inland water transport has survived on account of its suitability for moving certain types of cargo over long distances, economy in the use of energy and its low cost. As the inland waterways connect en-route many villages and serve the rural region, they provide stimuli to develop small scale and cottage industries in rural areas. More over Kerala being mostly rural, the inland waterways play an important role in the economic uplift of rural areas by providing transport connections, better irrigation and augmentation of pisciculture.

A study conducted in Cochin Region by the National Traffic Planning and Automation Centre (NATPAC) revealed that the inland water transport provided direct and indirect employment to 19,058 people in the study region, and roughly this works out to 7 per cent of the working force in the region. The total employment, both direct and indirect, per Rs. 1,00,000 of investment worked out to 33.59 man-years.

Apart from their navigational importance and potentiality for fisheries, the inland waterways offer unique potential for the development of tourism. A co-ordinated development of inland water transport system and tourist infrastructure would increase phenomenally the tourist traffic, both foreign and domestic.

National Waterway

Considering the advantages such as low cost of transportation, economy in the use of energy, capacity for expansion and capability to increase service without encountering physical constraints, it is imperative to develop and foster this mode of transport at the national level at least for carrying bulk commodities. In view of these facts, and also of the potentiality of the west coast canal, the National Transport Policy Committee of the Planning Commission has recommended the development of this canal as a national waterway.

A national organisation, the Inland Waterways Authority, instituted in October 1986 for the development, maintenance and management of national waterways is conducting studies on various aspects of developing nine major waterways identified to be made national waterways. The Government of India will be directly responsible for developing the waterways for shipping and navigation. These include the Quilon - Cochin section of the West Coast Canal (175 km.) in Kerala, in addition to the rivers, Brahmaputra, Godavari, Krishna, Mahanadi, Narmada and Tapti, the Sunderbans, the river canal systems of Mandovi, Zuvari and Cumbarjuain and the Haldia-Allahabad stretch of the Ganga-Bhagirathi, Hoogly river system; the last of which has already been declared as a national waterway.

Agencies like the National Transportation Planning and Research Centre, the Rail India Technical and Economic Services and a team of Dutch Experts are assisting it in the venture.

The State Water Transport Department (SWTD), Kerala Inland Navigation Corporation (KINCO) and Kerala State Road Transport Corporation (KSRTC) are the three public sector agencies involved in the water transport operations in the State. The activities of the SWTD are centered largely around the districts of Quilon and

Alleppey and that of KINCO and KSRTC around Cochin. While the SWTD and the KSRTC are engaged in passenger operations, the KINCO is concerned mainly with cargo. transport. The total number of passenger boats under these three agencies stood at 95. Together these boats provided a total seating capacity of 9066, and carried 2.5 crore passengers. 1461 persons were employed in the three organisations during the year 1985-86.

Air Transport

Air Transport Services in the State are being operated from Trivandrum, the capital city and Cochin, the leading commercial centre of the State. Air transport was first introduced into Trivandrum with the inauguration of the Bombay-Trivandrum Air Mail Service on October 29, 1935. It was run by the Tata Sons Ltd., in co-operation with the then Government of Travancore. The service which was started as a seasonal one was not operated during the monsoon due to the lack of the ground organisation and the lack of traffic during that season. Compared with sea or train journeys between Bombay and Trivandrum, the service afforded a time saving of 46 hours at that time. The service, in conjunction with the Karachi-Madras Service of those days provided connection with the then Imperial Airway Service.

The number of passengers originating from the two airports of Trivandrum and Cochin during 1985-86 was 3.24 lakhs, and increase of about 11 per cent over the previous year (2.9 lakh passengers). The passenger traffic terminating at these airports also increased from 3.2 lakhs in 1984-85 to 3.6 lakhs in 1985-86. Originating freight traffic decreased from 2364.8 tonnes to 2194.6 tonnes in this period. This was mainly due to the decrease in freight traffic from Trivandrum to Mali airport. The freight traffic terminating the airports of Kerala increased to 3449.5 tonnes from 2778.4 tonnes, an increase of 24 per cent.

A Flying Club the first of its kind in Kerala is functioning in the Trivandrum Airport to instil air-mindedness among the younger generation. The Club is subsidised by the Central and State Governments. A number of young men are undergoing flying training at this Airport. The hangar is used for housing the Club Air Craft and also as a Club Workshop.

The recent development of the Trivandrum Airport into an international Airport consequent on the introduction of direct flights to the Gulf countries, has increased simultaneously the air cargo capacity to the potential markets of West Asia.

An Air Cargo complex in the Trivandrum Airport is operating, providing the infrastructural facilities in the field of Customs Clearance, Warehousing etc. The main items of Export by air are Cardamom, Chemicals, Coir Products (samples) Handicrafts, Fruits, Flowers, Vegetables, Tinned Foodstuffs, Eggs, Drugs and Medicines, Ayurvedic preparations, Herbal and Toilet Products, Sandalwood oil and other vegetable oils, Oleoresins of spices and spice oils etc. The major items imported are chemicals and chemical preparation, Drugs and Medicines, Instruments, Apparatus, Paper and Paper Board, Books and Periodicals, Precision Equipments, Appliances, Machinery and parts, Plastic Materials, Vehicle Parts, and Baggage items of Indian expatriates.

There are internal flight connections from Trivandrum to Bombay, Delhi, Goa, Cochin, Madras, Bangalore and Hyderabad in addition to the international flights to Colombo and Mali, operated by Indian Airlines—the scheduled air service in the public sector established in 1953 under the Air Corporation Act, 1953. The Indian Airlines fleet consists of Airbus and Boeing 737 planes. Cochin has airlinks with Bombay, Trivandrum, Delhi, Goa, Bangalore and Madras. Vayudoot was incorporated in 1981 to connect stations not covered by Indian airlines which are important as centres of trade and commerce, or from the point of view of tourism. Vayudoot was initially incorporated as a private limited company. Subsequently in 1983, it was connected with a public limited company. Vayudoot is operating a tri-weekly flight from Cochin to Madras touching Tanjore and Madurai enroute. The Air India, which is also a public sector corporation maintaining international air transport operates flights from Trivandrum to Abu-dhabi, Dubai, Dhahran, Sharjah and Ras-el-Khymah.

An air field constructed at Karipur near Kozhikode which is expected became operational by the end of 1987. This places Kozhikode on the air map of India. Already a booking office of the Indian Airlines was functioning at Kozhikode, which is the second off line station of the Indian Airlines in the Southern Region (off line station is an airline office at a place where there is no airport). It was the first off line station to have real time computer, facility providing the passengers on the spot details about reservation and confirmation of tickets.

Travel and Tourist Facilities

Kerala has attracted tourists from all parts of the world from very early days. In the past there were Sathrams built

for the convenience of travellers at convenient places on the main travel routes. These were supplemented by victualling centres like Uttupuras, Conjee Houses where the weary could quench and satiate their thirst and hunger gratis.

The Agarasala or Uttupura attached to the Sri Padmanabhaswami temple catered to the feeding of about 1,500 persons at a time. Another form of charitable institution that existed in those days particularly in the summer was the water pandal (*Thanneer Pandal*) where Buttermilk flavoured with Salt and Lime juice or Curry leaves was served on a no cost basis. These institutions of charity have virtually become relics of the past and their place has been taken up by the modern Travellers Bunglows, Rest houses and Camp sheds which are open to all bona fide travellers on payment basis. These are maintained by the Public Works Department and the Department of Tourism. These buildings are equipped with necessary items such as furniture, crockery and linen. Officials of both State and Central Governments travelling on purposes of State are eligible for concessional fare.

A list of important Travel houses maintained by Government is given in the table. Accommodation may be reserved for Government officers and other Tourists for a period of three days on formal application to the District Collector or the Executive Engineer as the case may be.

In addition to the above, there are Tourist houses maintained by the Municipalities in leading towns, by the Devaswom in important centres of pilgrimage like Guruvayoor and Sabarimala.

The State Department of Tourism and the Kerala Tourism Development Corporation are the two agencies involved in the Development of Tourism in the State. The Directorate of Tourism is by and large, acting as the hospitality wing of the Government and maintains Tourist Bungalows and State owned Guest Houses. The role of the Kerala Tourism Development Corporation set up in 1965 is confined to running hotels, and conducted tours to places of tourist importance.

The principal preferences of a tourist to visit a place—Beaches, Backwaters, and Wild Life are found in plenty in Kerala. The culture of Kerala provides additional attraction. It has been estimated that about 20,000 tourists visited Kerala in the year 1978. The number of home (domestic) tourists is

assumed to vary between 7 to 9 times the number of foreign tourists. An all India Tourism Survey conducted by the Administrative Staff Colleges of India in 1976-77 estimated that 2.7% of Foreign Tourists visiting India reach Kerala. This percentage was likely to go up to 3.15% by 1987 based on promotional measures and facilities being developed. Domestic Tourists visiting Kerala were expected to increase from 1.6 lakhs in 1976 to 4.5 lakhs in 1987 (based on an average multiplier of 8 over projected Foreign Tourist arrivals in Kerala). A Survey conducted by PATA (Pacific Area Travel Association) in 1980, placed the amount of Tourist Trafic to Kerala at 6% of the total influx of Tourists into India. The strategy for development of tourists involves the creation of travel circuits connecting important tourist centres catering to varied tourist interests.

The following two primary travel circuits are being developed:

1. Trivandrum-Veli-Kovalam-Ponmudi-Varkala-Quilon Aranmula-Kottayam-Kumarakom-Thekkady-Munnar-Cochin.

2. Cochin-Trichur-Guruvayoor-Cheruthuruthy-Malampuzha-Kottakkal-Kozhikode-Sultan Battery-Ezhimalai.

To promote Youth Tourism both domestic and international, the Department of Tourism of the Government of India has constructed a Youth Hostel at Veli, a picturesque suburb of Trivandrum, bordering a backwater, where good accommodation at moderate tarriffs are available.

In the cities of Trivandrum, Cochin, Kozhikode, Trichur and Kottayam travel agents and tour operators function to promote tourist traffic. There is a regional office of the Department of Tourism in Cochin performing the promotion and marketing of tourist publicity.

Another prime mover in the progressive development and expansion of India's tourist infrastructure—The India Tourism Development Corporation, The ITDC (established on 1-10-1966) operates a beach resort at Kovalam. It runs a duty free shop at Trivandrum Airport providing shopping facilities to international Tourists. It is also constructing a hotel at Cochin.

The Kerala Tourism Development Corporation (KTDC) conducts tours to places from Trivandrum and Cochin. The details are given below.

In Trivandrum all tours start from K. T. D. C. Reception Centre, Thampanoor near Central Railway Station and return there.

1. Trivandrum tour—A conducted tour of important landmarks of Trivandrum Daily.
2. Kanyakumari—Daily.
3. Ponmudi—Daily.
4. Periyar Wild Life—(Tiger Reserve) Sanctuary—Once a week (two days).
5. Kodaikanal Tour—(3 days)

In Cochin tours start from Kerala Tourism Development Corporation Reception Centre, Shanmughom Road.

1. Periyar Wild Life (Tiger Reserve) Sanctuary tour (2 days).
2. Half-day cruise in Cochin backwaters—by boat.
3. Sunset cruise in Cochin backwaters—by boat.
4. Cochin-Kumarakom—one day tour—daily.

TABLE XIV

Government Guest Houses maintained by the Department of Tourism

Guest House, Trivandrum
do. Attingal
do. Varkala
do. Ponmudi
do. Kovalam

Quilon District

Guest House, Quilon

Kottayam District

Guest House, Kottayam

Idukki District

Guest House, Munnar
Guest House, Peerumede

3|9603|MC.

Ernakulam District

Guest House, Ernakulam
do. Trippunithura
do. Alwaye

Trichur District

Guest House, Trichur
do. Cheruthuruthy

Palghat District

Guest House, Malampuzha

Malappuram District

Guest House, Malappuram

Kozhikode District

Guest House, Kozhikode

Cannanore District

Guest House, Cannanore

TABLE XV

Rest Houses and Travellers Bungalows under the control of the District Collector of the Districts concerned and maintained by the Buildings wing of the Public Works Department (with Telephone facilities)

Trivandrum

1. Rest House, Trivandrum (Thycaud)
2. do. Parassala

Quilon

3. do. Quilon
4. do. Punalur

Pathanamthitta

5. do. Pathanamthitta
6. do. Thiruvalla

Alleppey

7. do. Alleppey
8. do. Mavelikkara
9. do. Kayamkulam

Kottayam

10. Rest House, Kottayam
11. do. Kottayam V.I.P. Room
12. do. Kanjirapally
13. do. Palai
14. do. Changanacherry
15. do. Vaikom
16. do. Erattupettah

Idukki

17. do. Painavu
18. T. B. Munnar
19. do. Thalayolapparambu
20. do. Thodupuzha

Ernakulam

21. Rest House, Ernakulam
22. T. B. Alwaye (Kottaram)
23. T. B. Alwaye Class 2 (Rest House)
24. T. B. Fort Cochin
25. Camp Shed, Angamali (T. B.)
26. Camp Shed, Perumbavur
27. Camp Shed, Muvattupuzha
28. T. B. North Paravur

Trichur

29. Rest House, Trichur
30. T. B. Chalakkudi
31. Rest House, Kodungalloor
32. T. B. Chavakad

Palghat

33. Rest House, Palghat
34. T. B. Shoranur
35. do. Pattambi

Malappuram

36. Rest House, Manjeri
37. do. Tirur
38. do. Malappuram
39. do. Ponnani
40. T. B. Perinthalmanna
41. Rest House, Angadippuram
42. do. Kottakal

Kozhikode

43. Rest House, Kozhikode
44. do. Badagara
45. T. B. West Hill
46. T. B. No. 1 Kozhikode
47. do. No. 2 (Annex Kozhikode)

Wynad

48. Rest House, Kalpetta
49. Mananthavady

Cannanore

50. Rest House, Payyannur
51. do Tellicherry

Kasaragode

52. Old Rest House, Kasaragode
53 Kanjangad

Posts and Telegraphs and Telephones

The history of modern postal system may be traced to 1837 when the postal services hitherto run on a restricted scale were thrown open to the public. The Indian Postal Department was set up in 1854 when about 700 post offices were already functioning in the country. The other notable landmarks were the introduction of the money order system in 1880, starting of Post Office Savings Bank in 1882, and the Postal Life Insurance in 1884. The Railway Mail Service was started in 1907, and the Airmail Service in 1911.

In the State of Travancore, there was an indigenous postal system called the "Anchal" which dealt with the transmission

of letters. A document of the year 965 K. E., (1790 A. D.) shows that at that time Travancore State was divided into two Anchal divisions one extending from Thovala to Varkala and the other from Quilon to Parur each of which was under a *Melvicharippu* or Superintendent*. The British Indian Postal System was first introduced in Travancore in 1857 when the Alleppey Post office was opened followed by the Trivandrum and the Quilon Post offices in 1863 and 1864 respectively. Telegraph Offices were also opened in the same year. The local Anchal and the British Indian Postal System were functioning side by side till April 1, 1951 when the Anchal Department merged into the Indian Postal Department.

In Cochin State also the Anchal system (established in 1791) prevailed with the sole object of transmitting official communications from place to place. Later the Anchal Department was authorised to accept private communications and transmit them free, and Tapal runners also were allowed to carry them on their own account. It was only in 1865 that the Cochin Anchal Department began to carry private letters and parcels regularly, levying postage on them in money.

The Posts and Telegraphs Board which provides the postal and tele-communication service is divided into two boards each dealing with postal and tele-communication services. The postal department also discharges certain agency functions e. g., running Post Office Savings Bank, issuing National Savings Certificates and Postal Life Insurance policies and selling units of Unit Trust of India. It also sells application forms for examinations conducted by the Staff Selection Commission and income tax return forms.

The traffic mail has increased enormously in the country due to industrialisation and increase in population as well as in rate of literacy. The mail is carried both by surface and air. For surface mail various modes of conveyance such as rail, road, boats and cycles are used. All the principal cities connected by air are served and other cities are connected subsequently by surface. Under the All up scheme, all Inland letters, letter cards, post cards, registered letters and money orders are normally carried by air without surcharge. The Quick Mail Service (QMS) scheme introduced in 1975, covers all State capitals, headquarters of all Union Territories and important commercial towns. All unregistered articles bearing

* The Postal System in Travancore Commenced in 1784.

the Postal Index Number (PIN) of the destination and posted in special QMS letter boxes are covered by the scheme. Letters posted under the scheme are delivered within the delivery norms prescribed. Within the State the Quick Mail Service connects the district headquarters to the State capital.

Philatelic bureau counters have been opened in leading cities to cater to the votaries of stamp collection. First day cancellation of special|commemorative stamps are issued in these counters.

For efficient and correct handling of the growing volume of mail a numerical postal address code, known as the Postal Index Number (PIN) was introduced in 1972. The code has six digits which helps to identify and locate every departmental delivery post office excluding branch post office. The first digit indicates the region, the second the sub-region and the third the sorting district whereas the last three digits indicate a particular delivery post office in the areas served by the sorting district.

Communications

Kerala Postal Circle has at present 23 postal divisions, 35 Railway Mail Service divisions, 5 Mail Motor Service division units and one Central Stamp Depot. As on 1-4-1986, 4,748 Post Offices were functioning in the State consisting of 50 Head Post Offices, 1,418 Sub Post Offices, 609 Extra Departmental Sub Offices, 2,523 Branch Offices and 148 Mobile Post Offices.

The details relating to expansion of Postal net work since 1975 is furnished in table.

TABLE XVI

Growth of Post Offices in Kerala

Category	*As on 1st April*							
	1975	1980	1981	1982	1983	1984	1985	1986
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Head Offices	29	44	51	51	51	51	51	50
Sub Offices and Extra Departmental Sub offices	1,219	1,994	2,085	2,110	2,126	2,187	2,026	2,027
Branch Offices and Mobile Post Offices	2,774	2,474	2,440	2,486	2,501	2,511	2,,674	2,671
Total	[4,022	4,512	4,576	4,647	4,678	4,749	4,751	4,748

The average area served by a Post Office is 8.20 sq. kms. as against the All India figure of 22.26 sq. kms. and the population served by a Post Office on an average is 5,377 as against the all India figure of 4,730.

TABLE XVII

Area and population served by each Post Office in Kerala as on 1-4-1986

Sl. No.	*Name of Division*	*Name of District*	*Area served by each P.O. (sq.km.)*	*Population served by each Post Office*
1	Trivandrum North			
	Trivandrum South	Trivandrum	5.59	6,623
2	Quilon			
	Pathanamthitta	Quilon	7.41	6,647
3	Pathanamthitta			
	Thiruvalla			
	Quilon			
	Mavelikkara	Pathanamthitta	9.45	4,225
4	Alleppey			
	Mavelikkara			
	Thiruvalla			
	Quilon	Alleppey	5.10	6,653
5	Kottayam			
	Changanacherry	Kottayam	5.30	6,653
6	Idukki	Idukki	10.60	3,624
7	Ernakulam			
	Alwaye	Ernakulam	6.60	6,946
8	Trichur			
	Irinjalakuda	Trichur	6.25	5,030
9	Palghat			
	Ottappalam	Palghat	10.05	4,668
10	Malappuram			
	Tirur	Malappuram	9.28	6,067
11	Calicut			
	Badagara	Kozhikode	6.03	5,847
12	Tellicherry			
	Calicut	Wayanad	14.17	9,693
13	Kasaragod			
	Tellicherry			
	Cannanore	Cannanore	8.56	5,516
14	Kasaragode	Kasargod	9.33	4,156
	Average for State		8.20	5,377

Division-wise data relating to Post Offices in the State are furnished in table.

TABLE XVIII

Statistics of Post Offices as on 1-4-1986 (Kerala Circle)

Sl. No.	Name of Division	Head Offices	Sub Offices	ED Sub-Offices	Branch Offices	Mobile Offices	Total
1	Trivandrum North	2	76	9	93	11	191
2	Trivandrum South	2	65	18	105	11	201
3	Quilon	3	83	36	93	5	220
4	Pathanam-thitta	3	62	51	118	13	247
5	Mavelikara	1	41	23	37	2	104
6	Kottayam	3	81	46	132	2	64
7	Alleppey	3	65	46	44	12	170
8	Thiruvalla	2	58	30	53	..	143
9	Alwaye	3	67	39	120	3	232
10	Idukki	2	52	15	192	8	269
11	Changana-cherry	2	46	17	86	1	152
12	Ernakulam	2	70	6	51	4	133
13	Irinjalakuda	2	62	24	91	9	188
14	Trichur	3	103	37	144	9	296
15	Palghat	3	86	22	108	7	226
16	Ottappalam	1	52	24	129	6	212
17	Calicut	2	74	16	186	10	288
18	Malappuram	2	44	24	141	19	230
19	Tellicherry	1	43	9	133	2	188
20	Cannanore	2	54	16	94	1	167
21	Badagara	2	40	41	116	..	199
22	Kasaragode	2	36	31	175	4	248
23	Tirur	2	51	25	79	9	166
	Mahe*	..	1	1	2	..	4
	LMA Island**	..	6	3	1	..	10
	Total	50	1,418	609	2,523	148	4,748

*Mahe comes under Badagara Division.

**LMA Island comes under Ernakulam Division.

A reliable and economical Speed Post Service "Inland" and "International" was also introduced at Cochin during 1985-86. With this system Cochin is linked to 13 centres in India and five countries abroad i. e., U. K., U. S. A., Japan, Hongkong and FRG (Federal Republic of Germany). This has facilitated the delivery of postal articles on the next day in these thirteen centres in India. These 13 centres in India are Delhi, Bombay, Madras, Calcutta, Ahmedabad, Bangalore, Cochin, Guhati, Indore, Jaipur, Kanpur, Pune and Vadodara. Necessary arrangements have also been made to facilitate delivery in the foreign countries also quickly.

Telephones

In Travancore commencing from 1931 the Telephone System was operated on a local basis by the Electricity Department in Trivandrum. It was later introduced in the other leading towns like Quilon, Alleppey and Kottayam. In the wake of the Federal Financial Integration in 1950, the Telephone System of the State was taken over by the Indian Posts and Telegraphs Department.

In the Cochin State the first Telephone was installed in 1934. A Public Call Office opened at Trichur Post Office was connected to the Repeater Exchange at Shornur.

In the Malabar area a Telephone Exchange with a 50 line magneto board was opened in Kozhikode in 1925.

In respect of tele-communication facilities, Kerala State has a Telephone Exchange at every 6.5 kms. All the Sub Divisional Headquarters, Taluk Headquarters and Block Headquarters in Kerala State have telephone facilities. All the District Headquarters of Kerala State have been connected to the State Capital by S. T. D. or by No Delay Service. Kerala was the first State to achieve this. The density of telephones in Kerala is 5.15 per sq. km. compared to 1.23 for the country as a whole. The average number of telephones per thousand population in Kerala is 7.85 against the all India average of 5.1.

The number of telephone exchanges in Kerala increased from 561 in April 1985 to 608 in April 1987, with a total equipped capacity of 178,821 lines as shown in table appended.

TABLE XIX

Statistics relating to Telephone system in Kerala (in Nos.)

1.	Number of telephone exchanges	608
2.	Total equipped capacity	178,821
3.	Working connections	168,321
4.	Number of telephone sets	200,224
5.	Waiting list for new telephone connection	84,756
6.	Percentage of Automatisation	96.83
7.	Percentage of working connection covered with STD Service	63.48
8.	Number of Telephones per thousand population	7.85 All India 5.1
9.	Number of telephone per sq. km.	5.15 All India 1.23
10.	Number of Telex exchanges	11
11.	Telex capacity	1,410
12.	Telex working connections	1,187
13.	Telex waiting list	227
14.	Number of trunk automatic exchanges	3
15.	Stations connected to National Subscriber dialling and Inter-national dialling	44
16.	Number of Exchanges with group dialling facility	434

Public telephones with subscriber trunk dialling facility were first introduced in Kerala in 1979. As on 1-4-1987 the number of STD public telephones were 88 including 40 STD

public telephones manned by physically handicapped persons in public places. The total number of public telephones was 2,944 including 136 local public telephones manned by physically handicapped persons. The demand for new telephone connections is the highest in Kerala as compared to other States. The total waiting list for new telephone connections was 84,756 as on 1-4-1987.

The existing Telephone net work in the three cities—Trivandrum, Ernakulam and Kozhikode—and many major towns in the State is poised for expansion. While a new cross bar exchange would be set up in Kozhikode by 1988 the capacities of the exchanges in Trivandrum, Ernakulam, Trichur, Quilon, Cannanore, Palghat, Kalamassery, and also Kozhikode are being expanded. STD facility is being extended to Tirur, Pathanamthitta, Vizhinjam, Cranganore and Punalur. Work on a 2,000 line electronic digital trunk automatic exchange building is nearing completion in Ernakulam, and the installation of equipment would be completed by 1987-88. When this new exchange is commissioned, more stations will be connected to the national subscriber dialling net work and the performance of the STD system will be improved.

The biggest Manual Exchange in the State at Tellicherry with 1,800 lines is being automatised in 1987-88 and linked to national STD net work. New Electronic Exchanges of 400 line capacity each are being installed at Vaikkom and Munnar. A similar one is also proposed for installation at the Cochin Export Processing Zone.

The expansion envisaged in the various Exchanges is as follows:

Kozhikode Unit II	5,700 to 6,600 lines
Trivandrum	9,000 to 10,000 lines
Trichur	8,000 to 10,000 lines
Quilon	3,900 to 5,100 lines
Cannanore	4,500 to 5,700 lines
Palghat	3,900 to 4,500 lines
Ernakulam	10,000 to 12,000 lines
Kalamasserry	2,400 to 3,330 lines

By 1990 i. e., the end of the VII Plan all the Telephone Exchanges in the State would be automatised. An imported Optical Fibre system between Palghat and Trivandrum linking major stations en route is expected to be completed shortly. This high capacity link would improve the traffic considerably.

A Co-axial system between Calicut and Coimbatore is also being commissioned. Measures to reduce faults on the Telephone and achieve higher trunk efficiency are being implemented. The faults per 100 telephones a month are 25.67 and the Trunk Call efficiency is 77.7 per cent.

The Telephone Industries Limited (ITI) produces a wide range of Tele-communication equipments. One of its production Unit is located in Palghat and manufactures Trunk Automatic Exchange equipment, Rural Automatic Exchange equipment, Private Automatic Branch Exchange equipment etc. The Government have approved the expansion of the Palghat Unit of Indian Telephone Industries from the level of 10,000 equipment lines to 1.5 lakhs lines per annum.

The Telegraph network in Kerala is being modernised at a cost of Rs. 36 crores. The salient features of the modernisation programme are the commissioning of one store-and-forward message switching system with 128 lines in Cochin linked to all the major Telegraph Offices including important Combined Post Offices in the State and replacement of existing Electro-Mechanical Teleprinters with more efficient Electronic Teleprinters. Besides, Electronic Key boards are being provided to 230 combined Post Offices linking them with the switching system through concentrators. A maintenance and repair centre is being set up in Cochin.

At present, 62% of Telegrams booked in the State are expected to be delivered within 12 hours anywhere in the country. This is to be improved to 98% as a result of the new Project.

The capacity of the Telex Exchange at Trivandrum is being increased from 200 to 250 lines. Eleven telex exchanges with a total equipped capacity of 1,410 and 1,187 working connections are working in Kerala. New Telex Exchanges are being set up at Kasargode, Tellicherry, Changanacherry and Malappuram.

Radio Stations

Radio Broadcasts were first started by the erstwhile Travancore Government on March 12, 1943. The programmes which originated at the temporary Studios located at the Old M. L. A.'s Quarters at Palayam were fed on Over-head lines to the transmitting Station. Initially transmission was once a week. Gradually it was extended to two hours a day from August 1947; and from April 1, 1950, when the Station became a Unit of the All India Radio consequent on Federal Financial Integration, the hours of transmission increased to 5 hours per day. The temporary Studios located at Palayam were replaced by well equipped studios located at Bhakthivilas the former official residence of the Dewan of erstwhile Travancore State in 1952.

The Kozhikode Station of the All India Radio was commissioned on May 14, 1950 as the last in the series of Pilot Stations set up under the first phase of the development of All India Radio. In 1951, it was linked with the already existing All India Radio Station at Trivandrum for the mutual relay of programmes.

On November 4, 1956, immediately after the inauguration of the State of Kerala, a 20 K. W. Medium Wave Transmitter went on the Air at Trichur relaying programmes on telephone lines from All India Radio, Trivandrum and Calicut. The Air Station at Trichur is located at Viyyur.

In May 1965 with the addition of the Receiving Centre and a Transmission booth, it became an auxiliary centre of All India Radio, Trivandrum. Independent Programmes were started originating from Trichur for a duration of 90 minutes in 1973, and currently 360 minutes of originated programmes are broadcast.

There is also a relaying Centre of the All India Radio at Alleppey.

The All India Radio is one of the biggest media organisation in the country. It is serving as an effective medium not only to inform and educate people, but also to provide healthy entertainment. In order to create better appreciation of the musical heritage of the country specially among the younger generation, All India Radio broadcasts music lessons and music appreciation programmes regularly

from various All India Radio Stations. New talent is continuously scouted through the regular music auditions as well as annual music competition. Young and promising artists of higher grades are featured in public concerts through a system of chain booking which enables artists of one region to get exposure in the other regions of the country. Equal attention is paid to the preservation and development of folk and light music. To cite an illustration the All India Radio Station at Trichur broadcasts about 65 types of folk items and has on its list about 500 folk music troupes. Popular entertainment programme known as Vividh Bharathi is also broadcast from Trivandrum for a total direction of 12 hours and 45 minutes on week days and 13 hours and 15 minutes on Sundays and holidays. Film music, humorous skits, short plays and features are presented in these programmes. Commercial Broadcasting on the Radio is also carried on in the Trivandrum Station. Advertisements are accepted in any Indian language besides English, as tape recorded spots of 7, 10, 15, 20 and 30 seconds duration.

Each station broadcasts at least two plays every week. Besides Original plays, radio adaptations of outstanding novels, short stories and stage plays are also broadcast. The national programme of features, focuses attention on matters of national importance and interest in the political, economic, social or cultural spheres. The original script either in English or Hindi is translated into Malayalam and broadcast. Special programmes for rural listeners with a bias on the latest cropping practices and techniques is broadcast every day of a duration ranging from 30 to 75 minutes. Educational programmes based on school curriculum to benefit students in the interior areas are also broadcast.

The analysis of programmes broadcast from the All India Radio Stations in Kerala is as follows:

Transmission I	5.55 A.M. to 9.15 A.M. except Sundays
Transmission II	12.30 P.M. to 2.30 P.M. except Sundays
Transmission III	5.30 P.M. to 11.05 P.M. (All days)

Sundays

Transmission I	5.55 A.M. to 11.10 A.M.
Transmission II	12.30 P.M. to 3.30 P.M.

Total Hours of Broadcast per month (Approximate)

Music	140 hours—39%
Spoken Word	132 hours—36%
News	90 hours—25%

The frequencies in which the Broadcasts are done is:

Trivandrum	258.39 m (1161 kHz)
Trichur	476.2 m (630 kHz)
Kozhikode	438.6 m (684 kHz)
Alleppey	520.8 m (576 kHz)

Doordarshan

Television was started in India as an experimental service on 15 September 1959 when a centre was set up at Delhi with UNESCO assistance. In the initial years, transmission was limited to Delhi and adjoining rural areas and rural viewers were provided with community viewing sets. In the third decade of its operational life, it has emerged as an extensive national network, covering about 70% of India's population. This phenomenal expansion particularly in its Silver Jubilee Year backed up by indigenous technology has helped in linking a major part of the country's rural and remote areas with the national mainstream.

In December 1984, interim programme production facility was commissioned at Kudappanakunnu in Trivandrum with the inauguration of a studio centre. There is another High Power transmitter at Cochin and Low Power transmitters at Calicut. Cannanore and Palghat.

The future plans emphasise on increasing and augmenting its software facilities which include production of local television service, augmenting the facilities of studio centres in Trivandrum commissioning of Satellite Micro-wave links for the relay from the Trivandrum studio to other transmitters in the State.

The basic aim is to provide three segments in television programmes—national, regional and local for viewers living in different parts of the country.

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CHAPTER VIII

ECONOMIC TRENDS

Economic Trends serve as a yardstick for measuring economic stability and progress. They are indicative of the state of the economy. Progressive and dynamic trends bring about fundamental changes in the structure of the economy.

Livelihood Pattern

The 1981 Census throws much light on the livelihood pattern. The population was classified into two broad groups i. e. those who have worked at any time at all during the previous year and those who have not worked at all. After the population was classified on this basis, the next step was to divide those who have worked any time into two groups—(i) those who have worked in some economic activity for a period of 6 months (183 days) or more or during both the agricultural seasons in the year previous to the enumeration day and (ii) those whose work can be considered marginal or secondary.

These classifications in the 1981 Census, helped to obtain data on main workers, marginal workers and non-workers. This was on the basis of information collected through the economic questions. These concepts enable the calculation separately of the work participation rates for the total number of workers called "total work participation rate" and the work participation rate for main workers. The main workers were further divided into cultivators, agricultural labourers, household industry workers and other workers. Marginal workers were those who worked any time in the year preceding enumeration but who did not work for the major part of the year. Non-workers were persons who did not work any time at all in the year preceding the enumeration period. Only less than one third of the population in the State were workers.

The data for Kerala and India classified by the total number of workers by sex and by distribution of rural urban areas are given below. (Statement next page).

The total work participation rates for Kerala indicate more or less the same trend as that for all India. A discernible feature is that work participation rates in Kerala are lower than the rates for all India except in the case of female rates in urban areas. This is true of the earlier Census of 1961 and 1971.

TABLE 1

Workers and work participation rates, Kerala and India—1981

(Work participation rate is given within brackets as percentage to total population)

Census Year	Item	Total/Rural/Urban	Total	Males	Females	Total	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			Kerala			India	(Excluding Assam)	
1981	Population	T	25,453,680	12,527,767	12,925,913	665,287,849	343,930,423	321,357,426
		R	20,682,405	10,167,417	10,514,988	507,607,678	260,054,020	247,553,658
		U	4,771,275	2,360,350	2,410,925	157,680,171	83,876,403	73,803,768
	Workers	T	7,771,220	5,623,916	2,147,304	224,604,986	181,080,212	43,524,774
			(30.25)	(44.89)	(16.62)	(36.77)	(52.65)	(19.76)
		R	6,462,871	4,599,166	1,863,705	197,308,289	139,920,487	57,387,802
			(31.25)	(45.23)	(17.72)	(38.87)	(53.81)	(23.18)
		U	1,308,349	1,024,750	283,599	47,296,697	41,159,725	6,136,972
			(27.42)	(43.41)	(11.76)	(30.00)	(49.07)	(8.32)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Main Workers	T	6,791,175	5,141,149	1,650,026	225,516,574	177,543,406	44,973,168
			(26.68)	(41.04)	(12.77)	(33.45)	(51.62)	(13.99)
		R	5,605,055	4,188,182	1,416,873	176,433,890	196,830,905	39,602,985
			(27.10)	(41.19)	(13.47)	(34.76)	(52.62)	(16.00)
		U	1,186,120	952,967	233,153	46,082,684	40,712,501	5,370,183
			(24.86)	(40.37)	(9.67)	(29.23)	(48.54)	(7.28)
	Marginal Workers	T	980,045	482,767	497,278	22,088,412	3,536,806	18,551,606
			(3.85)	(3.85)	(3.85)	(3.32)	(1.03)	(5.77)
		R	857,816	410,984	446,832	20,874,399	3,089,582	17,784,817
			(4.15)	(4.04)	(4.25)	(4.11)	(1.19)	(7.18)
		U	122,229	71,783	50,446	1,214,013	447,224	766,789
			(2.56)	(3.04)	(2.09)	(0.77)	(0.53)	(1.04)

The population figures and work participation rates for 1981 for India exclude Assam where the 1981 Census could not be held owing to the disturbed conditions prevailing there.

The population figures for India exclude the population of areas under the unlawful occupation of Pakistan and China, where census could not be taken.

Source:—Census of India 1981—Series 10 Kerala.

Among the States in India, the highest total work participation rate for 1981 is recorded by Sikkim (48.30%) followed by Nagaland (48.23%), Meghalaya (45.92%) and Andhra Pradesh (45.76%). Among the 21 States in India (excluding Assam) Kerala (30.53%) was 20th in this respect while the lowest position was held by West Bengal with 30.17%. If the work participation rate based on main workers alone is taken into consideration, Kerala has the lowest rank among the States of India. The slight improvement in rank of Kerala Vis-a-vis West Bengal in respect of total work participation is due to the higher content of marginal workers (3.85%) as against that of West Bengal (1.91%). Jammu and Kashmir has the largest proportion of marginal workers with 13.89% while Nagaland records the lowest with 0.70%.

Of the State's total population of 25.45 million, 7.77 million (30.53%) are workers while the remaining 17.68 million are non-workers. Workers are comprised of main workers and marginal workers, their number being 6.79 million and 0.98 million respectively. In other words, out of the 30.53 per cent returned as workers, 26.68 per cent are main workers who worked for a major part of the year and 3.85 per cent are marginal workers i. e., those who did some work in the year preceding enumeration.

In the total population of the State, 3.49% are cultivators, 7.5% agricultural labourers, 0.98% workers in household industry, and 14.68% other workers. There was considerable difference between males and females in respect of work participation, while 44.89% of males are workers, only 16.61% of females are workers. However the percentage of marginal workers is the same (3.85) among males and females. While 6.43% of males are cultivators, only 0.63% of females are cultivators. But there were 5.56% of female as agricultural labourers against 9.57% among males. Both among males and females, the percentage of population engaged in household industry was very small and almost the same though the proportion of males was slightly more. The category of "other workers" constituted the largest share of workers. Though they claimed the major share of main workers among males, in the case of females, agricultural labourers, were almost equal to the number of "other workers". The statement given below shows the percentage distribution of total persons, males and females in State and Districts into workers, main workers by four categories, marginal workers and non-workers. (statement next page).

TABLE II

Distribution of population (Category-wise) 1981

State/District	Sex	Total population	Total workers	Main Workers: Total main workers	Main Workers: Cultivators	Main Workers: Agricultural labourers	Main Workers: Household industry manufacturing etc. V (a)	Main Workers: Other workers III, IV, V (b) & VI to IX	Marginal workers	Non-workers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Kerala	P	100.00	30.58	26.68	3.49	7.53	0.98	14.68	3.85	69.47
	M	100.00	44.89	41.74	6.43	9.57	0.99	24.05	3.85	55.11
	F	100.00	16.61	12.76	0.63	6.56	0.97	5.60	3.85	83.39
1. Cannanore	P	100.00	29.93	26.93	3.46	7.37	0.32	15.58	3.00	70.07
	M	100.00	43.92	41.04	6.04	8.43	0.70	25.87	2.88	56.08
	F	100.00	16.39	13.26	0.97	6.33	0.35	5.61	3.13	83.61
2. Wynad	P	100.00	38.04	33.54	7.10	13.28	0.33	12.83	4.50	61.96
	M	100.00	51.08	47.07	12.53	15.76	0.51	18.27	4.01	48.92
	F	100.00	24.30	19.29	1.38	10.68	0.14	7.09	5.01	75.70

3.	Kozhikode	P	100.00	27.10	21.86	1.21	3.17	0.61	16.87	5.24	72.90
		M	100.00	43.15	36.99	2.27	4.51	0.73	29.48	6.16	56.85
		F	100.00	11.38	7.04	0.18	1.85	0.50	4.51	4.34	88.62
4.	Malappuram	P	100.00	25.17	21.76	2.85	8.10	0.62	10.19	3.41	74.83
		M	100.00	40.37	36.35	5.46	11.40	0.91	18.58	4.02	59.63
		F	100.00	10.73	7.90	0.38	4.97	0.34	2.21	2.83	89.27
5.	Palghat	P	100.00	35.36	32.65	4.71	14.67	1.13	12.14	2.71	64.64
		M	100.00	47.09	44.53	7.80	14.12	1.56	21.05	2.56	52.91
		F	100.00	24.26	21.42	1.78	15.21	0.72	3.71	2.84	75.74
6.	Trichur	P	100.00	29.63	26.60	2.49	6.83	1.40	15.89	3.03	70.37
		M	100.00	41.81	38.78	4.50	7.05	1.21	25.97	3.08	58.19
		F	100.00	18.55	15.56	0.65	6.62	1.57	6.72	2.99	81.45
7.	Ernakulam	P	100.00	31.68	27.99	2.92	5.12	0.94	19.01	3.69	68.32
		M	100.00	46.94	42.99	5.21	5.65	1.00	31.19	3.95	53.06
		F	100.00	16.37	12.94	0.61	4.69	0.89	6.85	3.43	83.63
8.	Idukki	P	100.00	37.77	34.62	7.78	8.91	0.29	17.64	3.15	62.23
		M	100.00	51.51	48.58	13.93	11.82	0.44	22.39	2.93	48.49
		F	100.00	23.49	20.12	1.38	5.89	0.14	12.71	3.37	76.51

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
9. Kottayam	P	100.00	29.82	27.22	4.83	6.82	1.03	14.54	2.60	70.18
	M	100.00	46.89	44.31	9.40	9.75	0.95	24.21	2.58	53.11
	F	100.00	12.75	10.13	0.26	3.90	1.09	4.88	2.62	87.25
10. Alleppey	P	100.00	31.93	26.20	2.84	6.91	2.26	14.19	5.73	88.07
	M	100.00	43.91	38.86	5.42	8.36	1.36	23.72	5.05	56.09
	F	100.00	20.52	14.14	0.37	5.53	3.13	5.11	6.38	79.48
11. Quilon	P	100.00	30.27	24.64	4.94	6.24	0.81	12.65	5.63	69.73
	M	100.00	44.77	39.98	9.61	9.69	0.82	19.86	4.79	55.23
	F	100.00	16.13	9.69	0.38	2.88	0.79	5.64	6.44	83.87
12. Trivandrum	P	100.00	30.21	27.00	2.35	9.04	1.08	14.62	3.12	69.79
	M	100.00	46.39	42.94	4.46	14.74	1.17	22.57	3.45	53.61
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P. Persons, M. Males, F. Females

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Livelihood Pattern

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Source:—Census of India 1981—Series 10 Kerala

Among the States in India, the highest total work participation rate for 1981 is recorded by Sikkim (48.30%) followed by Nagaland (48.23%), Meghalaya (45.92%) and Andhra Pradesh (45.76%). Among the 21 States in India (excluding Assam) Kerala (30.53%) was 20th in this respect while the lowest position was held by West Bengal with 30.17%. If the work participation rate based on main workers alone is taken into consideration, Kerala has the lowest rank among the States of India. The slight improvement in rank of Kerala Vis-a-vis West Bengal in respect of total work participation is due to the higher content of marginal workers (3.85%) as against that of West Bengal (1.91%). Jammu and Kashmir has the largest proportion of marginal workers with 13.89% while Nagaland records the lowest with 0.70%.

Of the State's total population of 25.45 million, 7.77 million (30.53%) are workers while the remaining 17.68 million are non-workers. Workers are comprised of main workers and marginal workers, their number being 6.79 million and 0.98 million respectively. In other words, out of the 30.53 per cent returned as workers, 26.68 per cent are main workers who worked for a major part of the year and 3.85 per cent are marginal workers i. e., those who did some work in the year preceding enumeration.

In the total population of the State, 3.49% are cultivators, 7.5% agricultural labourers, 0.98% workers in household industry, and 14.68% other workers. There was considerable difference between males and females in respect of work participation, while 44.89% of males are workers, only 16.61% of females are workers. However the percentage of marginal workers is the same (3.85) among males and females. While 6.43% of males are cultivators, only 0.63% of females are cultivators. But there were 5.56% of female as agricultural labourers against 9.57% among males. Both among males and females, the percentage of population engaged in household industry was very small and almost the same though the proportion of males was slightly more. The category of "other workers" constituted the largest share of workers. Though they claimed the major share of main workers among males, in the case of females, agricultural labourers, were almost equal to the number of "other workers". The statement given below shows the percentage distribution of total persons, males and females in State and Districts into workers, main workers by four categories, marginal workers and non-workers. (statement next page).

TABLE II

Distribution of population (Category-wise) 1981

State/District	Sex	Total population	Total workers	Main Workers: Total main workers	Main Workers: Cultivators	Main Workers: Agricultural labourers	Main Workers: Household industry manufacturing etc. V (a)	Main Workers: Other workers III, IV, V (b) & VI to IX	Marginal workers	Non-workers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Kerala	P	100.00	30.58	26.68	3.49	7.53	0.98	14.68	3.85	69.47
	M	100.00	44.89	41.74	6.43	9.57	0.99	24.05	3.85	55.11
	F	100.00	16.61	12.76	0.63	6.56	0.97	5.60	3.85	83.39
1. Cannanore	P	100.00	29.93	26.93	3.46	7.37	0.52	15.58	3.00	70.07
	M	100.00	43.92	41.04	6.04	8.43	0.70	25.87	2.88	56.08
	F	100.00	16.39	13.26	0.97	6.33	0.35	5.61	3.13	83.61
2. Wynad	P	100.00	38.04	33.54	7.10	13.28	0.33	12.83	4.50	61.96
	M	100.00	51.08	47.07	12.53	15.76	0.51	18.27	4.01	48.92
	F	100.00	24.30	19.29	1.38	10.68	0.14	7.09	5.01	75.70

3.	Kozhikode	P	100.00	27.10	21.86	1.21	3.17	0.61	16.87	5.24	72.90
		M	100.00	43.15	36.99	2.27	4.51	0.73	29.48	6.16	56.85
		F	100.00	11.38	7.04	0.18	1.85	0.50	4.51	4.34	88.62
4.	Malappuram	P	100.00	25.17	21.76	2.85	8.10	0.62	10.19	3.41	74.83
		M	100.00	40.37	36.35	5.46	11.40	0.91	18.58	4.02	59.63
		F	100.00	10.73	7.90	0.38	4.97	0.34	2.21	2.83	89.27
5.	Palghat	P	100.00	35.36	32.65	4.71	14.67	1.13	12.14	2.71	64.64
		M	100.00	47.09	44.53	7.80	14.12	1.56	21.05	2.56	52.91
		F	100.00	24.26	21.42	1.78	15.21	0.72	3.71	2.84	75.74
6.	Trichur	P	100.00	29.63	26.60	2.49	6.82	1.40	15.89	3.03	70.37
		M	100.00	41.81	38.73	4.50	7.05	1.21	25.97	3.08	58.19
		F	100.00	18.55	15.56	0.65	6.62	1.57	6.72	2.99	81.45
7.	Ernakulam	P	100.00	31.68	27.99	2.92	5.12	0.94	19.01	3.69	68.32
		M	100.00	46.94	42.99	5.21	5.65	1.00	31.13	3.95	53.06
		F	100.00	16.37	12.94	0.61	4.69	0.89	6.85	3.43	83.63
8.	Idukki	P	100.00	37.77	34.62	7.78	8.91	0.29	17.64	3.15	62.23
		M	100.00	51.51	48.58	13.93	11.82	0.44	22.39	2.93	48.49
		F	100.00	23.49	20.12	1.38	5.89	0.14	12.71	3.37	76.51

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
9. Kottayam	P	100.00	29.82	27.22	4.83	6.82	1.03	14.54	2.60	70.18
	M	100.00	46.89	44.31	9.40	9.75	0.95	24.21	2.58	53.11
	F	100.00	12.75	10.13	0.26	3.90	1.09	4.88	2.62	87.25
10. Alleppey	P	100.00	31.93	26.20	2.84	6.91	2.26	14.19	5.73	88.07
	M	100.00	43.91	38.86	5.42	8.36	1.36	23.72	5.05	56.09
	F	100.00	20.52	14.14	0.37	5.53	3.13	5.11	6.38	79.48
11. Quilon	P	100.00	30.27	24.64	4.94	6.24	0.81	12.65	5.63	69.73
	M	100.00	44.77	39.98	9.61	9.69	0.82	19.86	4.79	55.23
	F	100.00	16.13	9.69	0.38	2.88	0.79	5.64	6 44	83.87
12. Trivandrum	P	100.00	30.21	27.00	2.35	9.04	1.08	14.62	3.12	69.79
	M	100.00	46 39	42.94	4.46	14.74	1.17	22.57	3.45	53.61
	F	100.00	14.49	11.69	0.31	3.50	0.99	6.89	2.80	85.51

P. Persons, M. Males, F. Females

Among the Districts, Wynad had the highest proportion of workers (38.04%) followed by Idukki (37.77%) while the lowest position was held by Malappuram (25.17%). The lowest proportion of 'main workers' was in Malappuram District and the highest proportion of main workers was in Idukki District (34.62%) followed by Wynad District (33.54%). The proportion of cultivators in the population is highest in Idukki District (7.78%), followed by Wynad was lowest in (7.78%); followed by Wynad. The proportion of agricultural labourers as highest in Palghat district (14.67%), one of the two rice bowls of the State, and the lowest in Kozhikode district (3.17%). Though Alleppey district having the Kuttanad area is the other rice bowl of the State, the proportion of agricultural labourers in this district (6.91%) was less than the proportion of agricultural labourers in the State as a while (7.53%). The reason for this phenomenon was that the agricultural labourers come from the neighbouring districts as well. Their migratory character perhaps accounts for the low rate. The proportion of workers engaged in household industry in the population was highest in Alleppey district predominant in coir industry and the lowest in Idukki district where plantation crops are more labour-oriented. The proportion of other workers" in the population was the highest in Alleppey district followed by Quilon district and the lowest in Kottayam district. In Alleppey and Quilon districts the proportion of female marginal workers was more than that of males. Large number of females are engaged in coir industry—predominant—in Alleppey district. The higher proportion of marginal workers in Alleppey district may be due to the occasional participation of female family workers in coir industry or in agriculture. Similarly Quilon district is a leading centre in cashew industry and large number of female workers are occupied in this industry. But the shortage of raw cashewnuts for processing, provides work only for a short period in a year, and hence it is possible for many of the cashew processing labour to be recorded as marginal workers.

In the case of males, Idukki and Wynad districts have the highest percentage of total workers (51.51% and 51.08% respectively) as well as main workers (48.58% and 47.07%) to the male population and Malappuram district has the lowest percentage of total workers (40.37%) and main workers (36.35%). In the case of females the percentage of total workers to female population is highest in Wynad district (24.30%) closely followed by Palghat district (24.28%) and is

lowest in Malappuram district (10.73%). But the percentage of female main workers is highest in Palghat district (21.42%) and lowest in Kozhikode district (7.04%). The work participation rate in rural areas is found to be higher than that in urban areas. This is the pattern for both sexes in the State as well as in all Districts except males in Trichur district and females in Kottayam district. The higher participation rate in the primary sector viz.; agriculture and in household industry in rural areas is naturally higher than that of urban areas and this has resulted in the higher work participation rate in the rural areas. But the proportion of 'other workers' to total population is higher in urban areas than in rural areas in all the districts except females in Idukki district. In the rural areas of Idukki district, there are many plantations and large number of female workers are engaged in these plantations. The higher participation rate of female "other workers" in rural areas than in the urban areas in this district may be due to this factor. Idukki district stood unique with the increase in total cultivators, (male and female included); the possible explanation could be the extensive conversion of forest lands for cultivation.

TABLE III

Working Population—Kerala—1981

Category	Number	Percentage to total workers	Percentage to total Population
1. Total Population	25,453,680	..	100
2. *Main workers*	6.791,175	87.39	26.68
(i) Cultivators	887,232	11.42	3.49
(ii) Agricultural labourers	1,917,362	24.67	7.53
(iii) Household industries, manufacturing, processing, servicing and repair	250,506	3.22	0.98
(iv) Other workers	3,736,075	48.08	14.68
3. *Marginal workers*	980,045	12.61	3.85
Total Workers	7,771,220	100.00	30.53
Non-Workers	17,682,460	..	69.47

General Level of Prices and Wages

Prices

A study of the general level of prices and wages is essential for a proper understanding of the general economic condition of a people. The prices of agricultural commodities rose steadily in the latter half of the 19th century, as testified to by the detailed information provided by The Malabar Manual, The Malabar District Gazetteer, The Cochin and Travancore State Manuals. The rising trend in price level continued in the early decade of the 20th century—the rise being more pronounced. This had a favourable effect on the general economic condition. The first World War further accentuated the rise. The prices of almost all agricultural commodities registered a faster upward movement which continued to manifest in the post-war period as well. Inflation not only eroded the restricted purchasing power of the fixed income group but also distorted their consumption pattern. The economic slump commencing from 1929 stifled economic growth throughout the world, and Kerala State was no exception to this phenomenon. From this date onwards, a steep fall noticeable in commodity prices adversely affected the agriculturists. The fall in agricultural prices was not accompanied by a corresponding change in the cost of cultivation. Agricultural indebtedness assumed acute proportions. Cultivators became dispossessed of their holdings by the creditors. The Government had to intervene by introducing measures of debt relief to relieve the agriculturists from the crushing burden of debt.

The deteriorating economic condition was mitigated to a certain extent by the outbreak of the II World War in 1939. The Wartime exigencies accounted for the steady rise in the general level of prices in the forties. In 1950-51, just prior to the launching of the First Five Year Plan, food prices rose further as a sequel to the Korean war. This trend was momentarily reversed in 1952-53, with the ceasefire in Korea and improvement in the world production of wheat and rice and better crop conditions in the country.

The massive investment policy of Government and the pattern of financing largely through public borrowings and foreign loans, explains for the progressive rise in prices in the subsequent period. This was further accelerated by the growth of population, rises in consumer incomes, cost of production, and transportation. Price movements in Kerala have been considerably conditioned by the pressures exerted by the rest of the economy. The inadequate internal production, scanty external support and speculative hoarding of a significant dimension have sharply pushed up the internal price level particularly of essential items of consumption like rice, onions, sugar and vegetables. The general price rise in Kerala during the decade 1951-52 to 1961-62, in respect of select commodities is shown in the table below. (Table next page).

It was observed that the all India wholesale price index numbers which stood at 105.3 at the beginning of II Five Year Plan (1956-57) rose to a much higher level of 140.2 in 1960-61, a rise of 34.9% over the five years. Prices of food articles rose by 38.6% and that of industrial raw materials by 46.9% during the period. The proportionately higher rate of increase in the prices of industrial raw materials could be explained by the expanding industrial activity. The same was reflected in Kerala as well. Apart from this the price situation can well be gauged by considering the price trends of specific commodities like rice, tapioca, sugar etc., all of which were on the ascent despite the satisfactory distribution of essential commodities through fair price shops, diminished crop arrivals, increase in demand and rise in prices in the producing areas. The price of rice in Kerala is to a considerable extent conditioned by the market behaviour in the important production centres of Andhra and Tamil Nadu, from where Kerala purchases the bulk of its requirement in the open market. The yearly average retail prices of necessary commodities (district-wise) from 1960-1984 is given in the adjoining table.

TABLE IV

Retail prices in Rupees of some selected commodities in Kerala during 1951-52 to 1961-62 (July to June)

Commodity	Unit	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60	1960-61	1961-62
1. Rice	kg.	0.52	0.52	0.52	0.51	0.51	0.62	0.61	0.66	0.68	0.67	0.70
2. Sugar	,,	1.12	1.06	1.01	0.99	0.99	1.01	0.17	1.21	1.41	1.23	1.19
3. Tea	,,	5.50	4 84	5 15	5.30	6.08	5.50	5.33	5.28	5.88	6.08	6.23
4. Coconut	100 Nos.	19.35	17.67	17.44	15.81	14.90	16.21	19.96	21.32	21.76	24.17	22.28
5. Arecanut	,,	1.75	1 80	2.14	2.36	2.24	2.61	2.99	2.91	3.11	3.18	3.84
6. Blackgram	kg.	0.81	0.79	0.70	7.57	0.59	0.81	0.70	0.70	0.70	0.70	0.77
7. Greengram	,,	0.77	0.77	0.72	0.44	0.53	0.59	0.66	0.81	0.77	0.81	0.79
8. Brinjal	,,	0 37	0.33	0.37	0.30	0.35	0.37	0.37	0.33	0.39	0.41	0.42
9. Pumpkin	,,	0.18	0.18	0.18	0.16	0.16	0.16	0.16	0.18	0.18	0.88	0.22
10. Mutton	,,	2 49	2.51	2 38	2.20	2.27	2.35	2.42	2.60	2.66	2.86	3.17
11. Onion	,,	0.41	0.26	0.26	0.17	0.26	0.20	0 30	0.24	0.30	0.28	0.35
12. Firewood	Qtl.	2 80	2.76	2.73	2.63	2.57	2.52	2.47	2.49	3.17	3.52	3.94
13. Pepper *	kg.	11.15	10.71	6.36	3.59	3.59	2.14	1.90	1.98	4.24	4.25	3.[illegible]
14. Ginger*	,,	2.85	1.53	1.64	2.80	3.10	1.50	0.81	0.96	1.58	1.36	1.56

*Relates to wholesale prices as retail prices are not available.

Source: Directorate of Economics and Statistics.

TABLE V

Yearly average retail prices of necessary commodities 1960-1984 (District-wise)

(*In Rupees*)

Sl. No.	Commodity	District	1960	1970	1980	1984
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Rice (O.M.)/Kg.	Trivandrum	0.61	1.60	2.58	4.84
		Quilon	0.60	1.58	2.37	3.74
		Alleppey	0.63	1.54	2.29	3.57
		Kottayam	0.62	1.55	2.39	3.55
		Idukki	..	..	2.43	3.92
		Ernakulam	0.59	1.65	2.39	3.69
		Trichur	0.58	1.59	2.39	3.69
		Palghat	0.57	1.34	2.37	3.46
		Malappuram	..	..	2.35	3.71
		Kozhikode	0.62	1.53	2.46	3.93
		Wynad	..	..	..	3.68
		Cannanore	0.61	1.56	2.40	3.76
2	Chillies/kg.	Trivandrum	2.96	6.53	9.05	18.23
		Quilon	2.97	6.26	7.69	14.95
		Alleppey	3.04	6.24	7.93	15.18
		Kottayam	2.99	6.40	8.64	16.37
		Idukki	..	..	8.03	15.16
		Ernakulam	3.18	6.58	8.54	16.06
		Trichur	3.21	6.58	8.71	16.71
		Palghat	3.16	7.03	8.38	15.94
		Malappuram	..	..	8.72	15.06
		Kozhikode	3.07	6.17	9.30	17.30
		Wynad	..	..	..	16.72
		Cannanore	2.96	6.49	8.49	17.37

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3 Onion/Kg.		Tivandrum	0.31	0.67	1.83	3.68
		Quilon	0.27	0.57	1.59	3.03
		Alleppey	0.28	0.56	1.48	3.07
		Kottayam	0.29	0.55	1.58	3.20
		Idukki	..	..	1.53	3.00
		Ernakulam	0.31	0.63	1.65	3.20
		Trichur	0.28	0.53	1.65	3.20
		Palghat	0.29	0.54	1.33	2.88
		Malappuram	..	..	1.48	3.14
		Kozhikode	0.30	0.57	1.78	3.03
		Wynad	..	..	[illegible]	3.82
		Cannanore	0.33	0.61	1.67	3.45
4 Salt/Kg.		Trivandrum	0.07	0.10	0.30	0.64
		Quilon	0.07	0.11	0.28	0.46
		Alleppey	0.07	0.10	0.28	0.49
		Kottayam	0.08	0.12	0.30	0.52
		Idukki	..	..	0.30	0.51
		Ernakulam	0.09	0.14	0.32	0.60
		Trichur	0.09	0.14	0.28	0.54
		Palghat	0.07	0.13	0.28	0.50
		Malappuram	..	..	0.30	0.50
		Kozhikode	0.08	0.16	0.39	0.69
		Wynad	[illegible]	..	..	0.68
		Cannanore	0.09	0.19	0.43	0.71

(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	Coconut (Without husk)/Doz.	Trivandrum	..	..	15.67	36.86
		Quilon	..	..	18.53	38.62
		Alleppey	..	..	17.84	38.86
		Kottayam	..	..	19.68	45.98
		Idukki	..	..	22.01	44.59
		Ernakulam	..	..	19.43	42.21
		Trichur	..	..	18.83	42.27
		Palghat	..	..	16.35	41.94
		Malappuram	..		16.34	36.82
		Kozhikode	..	..	17.58	36.43
		Wynad	..	..	..	46.40
		Cannanore	..	..	17.41	37.13
6	Coconut Oil/ltr.	Trivandrum	2.59	7.48	16.48	34.45
		Quilon	2.56	7.39	14.78	31.67
		Alleppey	2.36	7.28	14.83	34.15
		Kottayam	2.51	7.98	14.98	33.86
		Idukki	..	..	15.40	34.07
		Ernakulam	2.38	7.32	16.48	35.89
		Trichur	2.38	7.24	15.36	32.92
		Palghat	2.57	7.44	15.29	32.25
		Malappuram	..	..	15.13	33.02
		Kozhikode	2.54	7.36	15.61	33.13
		Wynad	..	..	..	34.97
		Cannanore	2.34	7.31	15.18	33.10

(1)	(2)	(3)	(4)	(5)	(6)	(7)
7	Gingelly oil/ltr.	Trivandrum	2.83	6.26	14.53	19.89
		Quilon	2.77	6.36	13.53	19.65
		Alleppey	2.94	6.25	12.56	18.04
		Kottayam	3.03	6.15	13.70	19.67
		Idukki	..	..	13.92	19.93
		Ernakulam	2.77	6.19	15.00	22.14
		Trichur	2.77	5.76	14.31	20.11
		Palghat	2.81	6.35	13.25	18.57
		Malappuram	..	..	13.35	20.05
		Kozhikode	3.15	6.23	13.95	19.69
		Wynad	..	..	..	20.16
		Cannanore	1.68	6.45	13.67	19.80
8	Dhall/kg.	Trivandrum	0.62	2.15	5.90	8.63
		Quilon	0.62	1.81	5.38	8.47
		Alleppey	0.58	1.70	5.51	8.19
		Kottayam	0.63	1.63	4.65	7.03
		Idukki	..	..	5.07	7.91
		Ernakulam	0.66	1.90	5.74	8.70
		Trichur	0.65	1.58	5.25	7.78
		Palghat	0.89	2.21	5.03	7.11
		Malappuram	..	..	4.61	7.29
		Kozhikode	0.65	1.62	5.18	8.51
		Wynad	..	..	..	7.50
		Cannanore	0.71	1.79	5.62	7.60
9	Greengram/kg.	Trivandrum	0.71	1.71	5.05	6.84
		Quilon	0.74	1.69	4.74	6.34
		Alleppey	0.79	1.54	4.56	5.81
		Kottayam	0.79	1.63	4.34	6.15
		Idukki	..	..	4.65	5.97
		Ernakulam	0.75	1.69	5.10	6.94
		Trichur	0.90	1.60	4.99	6.53
		Palghat	0.79	1.93	4.88	6.52
		Malappuram	..	..	5.09	6.61
		Kozhikode	0.77	1.39	5.22	7.38
		Wynad	..	..	..	6.82
		Cannanore	0.72	1.48	5.06	6.39

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(1)	(2)	(3)	(4)	(5)	(6)	(7)
10	Blackgram/kg.	Trivandrum	0.70	1.55	4.25	6.71
		Quilon	0.70	1.49	3.95	6.62
		Alleppey	0.65	1.44	3.85	6.49
		Kottayam	0.68	1.51	4.33	7.21
		Idukki	..	...	4.40	7.56
		Ernakulam	0.68	1.45	3.69	6.96
		Trichur	0.68	1.32	3.69	6.38
		Palghat	0.73	1.53	4.00	6.89
		Malappuram	..	...	4.44	6.90
		Kozhikode	0.68	1.28	4.96	7.28
		Wynad	..	...	..	5.96
		Cannanore	0.69	1.33	3.57	6.07
11	Redgram/kg.	Trivandrum	0.67	1.48	4.22	5.65
		Quilon	0.61	1.39	3.68	4.86
		Alleppey	0.59	1.32	3.75	4.79
		Kottayam	0.64	1.40	3.85	5.02
		Idukki	..	...	3.62	4.87
		Ernakulam	0.62	1.38	3.95	5.44
		Trichur	0.69	1.26	3.82	4.90
		Palghat	0.75	1.76	3.98	5.02
		Malappuram	..	...	3.74	5.13
		Kozhikode	0.64	1.30	4.01	5.28
		Wynad	..	...	...	5.32
		Cannanore	0.65	1.34	3.78	4.00

(1)	(2)	(3)	(4)	(5)	(6)	(7)
12	Plantain/kg.	Trivandrum	0.25	0.71	1.73	3.13
		Quilon	0.20	0.57	1.65	3.13
		Alleppey	0.26	0.89	1.58	2.58
		Kottayam	0.28	0.64	1.65	3.06
		Idukki	..	..	1.47	3.32
		Ernakulam	0.29	0.60	1.55	2.80
		Trichur	0.24	0.85	1.58	2.41
		Palghat	0.23	0.70	1.73	2.45
		Malappuram	..	..	1.67	2.32
		Kozhikode	0.27	0.94	2.07	3.09
		Wynad	..	..	..	1.45
		Cannanore	0.28	0.64	1.72	2.42
13	Milk (Cow's)/Ltr.	Trivandrum	0.67	1.43	2.38	3.88
		Quilon	0.59	1.50	2.34	3.48
		Alleppey	0.60	1.46	2.39	3.29
		Kottayam	0.61	1.22	2.36	3.36
		Idukki	..	..	1.98	2.50
		Ernakulam	0.72	1.58	2.88	4.02
		Trichur	0.72	1.57	2.41	3.60
		Palghat	0.57	1.42	2.40	3.83
		Malappuram	..	..	2.78	4.00
		Kozhikode	0.87	1.50	2.60	3.94
		Wynad	..	..	..	3.25
		Cannanore	0.86	1.44	2.65	4.00
14	Milk (Buffaloe's) Ltr.	Trivandrum	0.83	1.78	3.09	4.88
		Quilon	0.85	2.05	2.84	3.99
		Alleppey	0.82	2.09	3.82	6.11
		Kottayam	0.87	1.68	2.77	3.91
		Idukki	..	..	..	..
		Ernakulam	0.92	1.99	3.50	4.50
		Trichur	0.81	1.80	3.00	4.57
		Palghat	0.67	1.52	2.40	3.83
		Malappuram	..	..	..	..
		Kozhikode	1.04	1.70	2.82	5.02
		Wynad	..	..	..	3.70
		Cannanore	1.03	1.90	3.09	4.80

(1)	(2)	(3)	(4)	(5)	(6)	(7)
15	Sugar/Kg. (O.M.)	Trivandrum	1.22	1.85	7.01	5.47
		Quilon	1.23	1.84	6.92	5.44
		Alleppey	1.23	1.84	7.36	5.27
		Kottayam	1.22	1.85	7.17	5.45
		Idukki	..	..	6.24	5.48
		Ernakulam	1.25	1.84	7.48	5.45
		Trichur	1.22	1.82	7.11	5.38
		Palghat	1.21	1.85	6.92	5.31
		Malappuram	..	..	7.09	5.34
		Kozhikode	1.23	1.83	7.32	5.35
		Wynad	..	..	..	5.46
		Cannanore	1.22	1.82	7.13	5.26
6	Brinjal/Kg.	Trivandrum	0.47	0.91	1.50	2.54
		Quilon	0.37	0.74	1.45	2.49
		Alleppey	0.44	0.82	1.66	3.64
		Kottayam	0.46	0.85	1.58	2.51
		Idukki	..	..	1.15	1.63
		Ernakulam	0.40	0.76	2.00	2.91
		Trichur	0.39	0.74	1.51	2.31
		Palghat	0.28	0.51	2.07	2.07
		Malappuram	..	..	0.89	1.84
		Kozhikode	0 38	0.66	1.86	2.24
		Wynad	..	..	..	2.97
		Cannanore	0.38	0.66	1.62	2.83
17	Ladies Finger/Kg.	Trivandrum	0.64	0.84	1.28	2.06
		Quilon	0.55	0.73	1.23	2.00
		Alleppey	0.61	0.82	1.33	2.26
		Kottayam	0.61	0.82	1.38	2.53
		Idukki	..	..	1.46	2.04
		Ernakulam	0.80	0.88	2.10	2.83
		Trichur	0.68	1.01	1.80	2.37
		Palghat	0.51	0.66	1.35	1.69
		Malappuram	..	..	1.52	2.17
		Kozhikode	0.73	0.69	2.09	2.41
		Wynad	..	..	..	3.22
		Cannanore	0.69	0.82	2.20	2.67

(1)	(2)	(3)	(4)	(5)	(6)	(7)
18	Cucumber/Kg.	Trivandrum	0.17	0.34	0.65	1.33
		Quilon	0.17	0.48	1.33	2.91
		Alleppey	0.18	0.47	0.88	1.81
		Kottayam	0.18	0.43	1.01	2.13
		Idukki	..	..	1.14	2.14
		Ernakulam	0.20	0.43	1.34	2.47
		Trichur	0.15	0.46	1.15	2.43
		Palghat	0.20	0.39	0.68	1.48
		Malappuram	..	..	0.71	1.35
		Kozhikode	0.18	0.31	1.09	2.27
		Wynad	..	..	..	2.24
		Cannanore	0.17	0.34	1.08	1.87
19	Pumpkin/Kg.	Trivandrum	0.16	0.30	0.69	1.43
		Quilon	0.16	0.33	0.98	1.31
		Alleppey	0.16	0.33	0.83	1.55
		Kottayam	0.18	0.36	1.10	1.98
		Idukki	..	..	0.92	1.59
		Ernakulam	0.19	0.33	1.09	1.76
		Trichur	0.20	0.39	1.10	1.74
		Palghat	0.19	0.37	0.83	1.19
		Malappuram	..	..	0.80	1.36
		Kozhikode	0.18	0.30	0.94	1.75
		Wynad	0.18	0.36	..	1.89
		Cannanore	0.18	0.36	0.96	1.49

(1)	(2)	(3)	(4)	(5)	(6)	(7)
20	Chenai/Kg.	Trivandrum	0.25	0.58	0.74	2.08
		Quilon	0.22	0.54	0.94	2.15
		Alleppey	0.20	0.51	0.90	2.17
		Kottayam	0.24	0.57	0.98	2.23
		Idukki	..	..	1.16	2.29
		Ernakulam	0.25	0.56	1.08	2.50
		Trichur	0.24	0.57	0.93	2.57
		Palghat	0.23	0.53	0.64	2.00
		Malappuram	..	..	0.86	2.28
		Kozhikode	0.25	0.51	0.97	2.57
		Wynad	..	..	..	2.73
		Cannanore	0.27	0.61	0.97	2.68
21	Tapioca/Kg.	Trivandrum	0.09	0.25	0.50	0.72
		Quilon	0.10	0.28	0.53	0.94
		Alleppey	0.11	0.28	0.61	1.00
		Kottayam	0.14	0.34	0.66	1.16
		Idukki	..	..	0.78	1.27
		Ernakulam	0.12	0.28	0.66	1.08
		Trichur	0.13	0.25	0.66	1.08
		Palghat	0.12	0.25	0.50	0.82
		Malappuram	..	..	0.64	1.08
		Kozhikode	0.14	0.27	0.72	1.19
		Wynad	..	..	..	1.10
		Cannanore	0.20	0.47	0.97	1.49

(1)	(2)	(3)	(4)	(5)	(6)	(7)
22	Coffee Powder/Kg. (Brooke Bond)	Trivandrum	6.76	12.87	18.30	29.00
		Quilon	6.66	10.89	18.57	27.97
		Alleppey	6.20	8.57	18.14	21.67
		Kottayam	5.15	9.77	18.49	26.94
		Idukki	..	..	16.00	17.36
		Ernakulam	5.51	8.61	18.26	29.60
		Trichur	6.61	10.32	17.84	28.33
		Palghat	6.64	11.45	17.71	28.16
		Malappuram	..	..	18.29	24.11
		Kozhikode	5.46	9.07	18.32	29.37
		Wynad	..	..	..	26.66
		Cannanore	5.86	10.40	18.04	28.95
23	Tea/Kg. (Brooke Bond)	Trivandrum	7.00	11.55	18.34	39.48
		Quilon	6.03	8.71	20.32	40.79
		Alleppey	5.46	6.44	19.00	..
		Kottayam	4.99	6.82	19.95	38.80
		Idukki	..	..	16.12	..
		Ernakulam	5.82	7.00	20.24	38.21
		Trichur	6.49	11.54	19.06	38.82
		Palghat	6.75	8.18	18.40	39.63
		Malappuram	..	..	19.39	39.61
		Kozhikode	5.96	6.49	19.16	38.72
		Wynad	..	..	..	32.70
		Cannanore	5.67	9.21	19.30	38.96

(1)	(2)	(3)	(4)	(5)	(6)	(7)
24	Betel leaves/(100 Nos.)	Trivandrum	0.34	0.57	2.33	2.54
		Quilon	0.30	0.53	1.62	2.59
		Alleppey	0.36	0.70	2.20	2.98
		Kottayam	0.28	0.62	2.31	3.00
		Idukki	..	..	1.67	1.27
		Ernakulam	0.25	0.51	2.28	3.27
		Trichur	0.18	0.39	1.85	2.39
		Palghat	0.14	0.28	0.83	2.24
		Malappuram	..	..	1.18	1.64
		Kozhikode	0.21	0.40	1.50	2.02
		Wynad	..	..	..	2.15
		Cannanore	0.18	0.39	1.13	1.86
25	Arecanut/(100 Nos.)	Trivandrum	3.51	4.65	8.41	15.56
		Quilon	3.82	4.89	8.67	19.51
		Alleppey	3.61	4.43	8.91	17.32
		Kottayam	3.80	5.37	8.85	18.10
		Idukki	..	..	7.80	14.44
		Ernakulam	3.31	4.35	8.50	17.81
		Trichur	4.08	5.81	11.03	22.53
		Palghat	2.74	4.51	8.01	13.74
		Malappuram	..	..	6.83	11.98
		Kozhikode	2.45	3.58	8.07	12.79
		Wynad	..	..	..	17.60
		Cannanore	3.46	4.22	6.82	12.90

(1)	(2)	(3)	(4)	(5)	(6)	(7)
26	Tobacco/Kg (Vadekkan)	Trivandrum	3.31	6.84	11.58	14.52
		Quilon	3.32	6.05	11.27	12.25
		Alleppey	3.55	6.53	10.11	13.00
		Kottayam	3.57	7.75	12.29	16.39
		Idukki	..	..	13.00	16.30
		Ernakulam	4.76	8.00	10.12	16.81
		Trichur	4.07	7.06	9.45	16.40
		Palghat	3.65	6.32	11.29	19.81
		Malappuram	..	..	12 00	19.17
		Kozhikode	4.48	7.61	13.66	20.52
		Wynad	..	..	..	24.73
		Cannanore	4.16	6.67	13.83	23.97
27	Tobacco/Kg. (Jaffna)	Trivandrum	7.00	8.41	13.78	12.52
		Quilon	6.94	8.64	10.15	14.81
		Alleppey	7.89	8.36	12.17	13.06
		Kottayam	8.71	8 14	13.42	16.53
		Idukki	..	..	16.00	18.52
		Ernakulam	..	9.67	15 36	17.87
		Trichur	..	13.33	14.11	20.91
		Palghat	..	..	..	..
		Malappuram	..	..	..	19.00
		Kozhikode	..	..	10.00	..
		Wynad	..	..	..	24.46
		Cannanore	..	..	..	..

3/9603/MC.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
28	Coriander/Kg.	Trivandrum	1.68	3.25	6.05	8.49
		Quilon	1.60	3.01	5.06	7.30
		Alleppey	1 53	2.60	5.04	- ..
		Kottayam	1.45	2.93	5.04	8.13
		Idukki	..	..	5.14	7.24
		Ernakulam	1.53	2.81	7.06	9.79
		Trichur	1.66	3.00	5.65	6.52
		Palghat	1.60	3.26	5.84	7.93
		Malappuram	..	..	4.71	5.97
		Kozhikode	1.64	3.02	6.03	..
		Wynad	..	..	..	..
		Cannanore	1.64	3.39	5.67	..
29	Mutton/Kg.	Trivandrum	2.52	5.75	17.21	22.92
		Quilon	2.46	6.00	19.65	23.17
		Alleppey	2.50	6.23	18.00	21.88
		Kottayam	2.74	6.00	19.00	21.25
		Idukki	..	..	17.7	22.00
		Ernakulam	2.72	6.17	17.41	20.12
		Trichur	2.86	6.37	18.85	22.17
		Palghat	2.74	6.00	16.73	21.92
		Malappuram	..	..	17.08	22.18
		Kozhikode	2.88	6.25	19.73	24.92
		Wynad	..	..	..	23.35
		Cannanore	3.31	6.34	19.46	24.00

(1)	(2)	(3)	(4)	(5)	(6)	(7)
30	Beef/Kg.	Trivandrum	1.11	2.50	8.00	10.67
		Quilon	0.95	2.50	7.65	10.25
		Alleppey	1.10	2.66	7.33	10.21
		Kottayam	1.10	2.67	7.10	9.49
		Idukki	..	..	8.80	9.08
		Ernakulam	1.00	2.23	7.22	9.22
		Trichur	1.21	2.23	6.81	10.20
		Palghat	1.06	2.17	6.31	9.38
		Malappuram	..	..	5.74	7.63
		Kozhikode	1.13	2.24	6.98	10.32
		Wynad	..	..	..	9.33
		Cannanore	0.93	2.16	7.51	9.33
31	Firewood/10 Kgs. (Split)	Trivandrum	0.42	0.94	5.08	6.40
		Quilon	0.54	0.70	3.56	4.85
		Alleppey	0.38	0.78	4.04	5.25
		Kottayam	0.27	0.66	1.74	2.50
		Idukki	..	..	0.86	..
		Ernakulam	0.45	0.71	3.68	3.87
		Trichur	0.40	0.73	3.17	4.50
		Palghat	0.40	0.89	3.43	4.46
		Malappuram	..	..	2.76	3.61
		Kozhikode	0.39	0.95	2.40	3.97
		Wynad	..	..	..	..
		Cannanore	0.42	1.10	3.50	3.90

(1)	(2)	(3)	(4)	(5)	(6)	(7)
32	Kerosene, Litre	Trivandrum	0.41	0.61	1.58	2.00
		Quilon	0.37	0.60	1.58	1.00
		Alleppey	0.37	0.59	1.55	1.95
		Kottayam	0.39	0.60	1.56	1.95
		Idukki	..	..	1.58	1.97
		Ernakulam	0.37	0.59	1.54	1.93
		Trichur	0.37	0.59	1.54	1.93
		Palghat	0.37	0.59	1.57	1.99
		Malappuram	..	..	1.58	1.98
		Kozhikode	0.37	0.63	1.59	2.01
		Wynad	.	..	..	2.04
		Cannanore	0.37	0.64	1.59	2.02

A review of the movement of prices of commodities from January 1976 to December 1979 reveals that there was a discernible upward movement in the prices of most of the commodities (Dhall and Gingelly Oil—67%, Coconut Oil—64%, Coconut—53%, Black gram—42%, potatoes—53%, Sugar—26%, and tapioca—19%) towards the end of December 1979*. In the case of onion there was a sharp upward surge raising the price by 306% in December 1979 reaching the peak level. However in other months during 1976 to 1979 the average prices ranged much below. In the case of sugar even though the price till October 1979 was far below than that of January 1976, there was a spurt at the end of December 1979, pushing the price by 89% above that in October 1979. The fall noticed in the price was significant especially in the case of rice (17%), coriander (36%) and chillies (15%). A similar

*This analysis is based on the Review on the movement of Prices of some Essential Commodities in Kerala, January 1976 to December 1979 conducted by the Bureau of Economics and Statistics.

review of the retail prices of essential commodities in 1980-81 confirmed the ascendancy in the price level, with variations in between. Over the two year period, prices of coconut oil, tobacco, washing soda and tooth paste, registered a decline, though in regard to coconut oil, prices did soar up in certain festival seasons. Generally, price fluctuations pegged prices to a higher level.

The variation in the retail prices of essential commodities showed a mixed trend in 1985. For a number of commodities there were only marginal variations in their retail prices reflecting a relatively greater price stability in 1985, compared to the previous year. A comparative picture of the retail prices of a group of essential commodities prevailing at the end of December 1984 and 1985 is given in the table. (Table next page).

Retail prices showed an increase of 18% over the year (on a point to point basis) as against a decline of 21% during the previous year. This trend is also true of tapioca and potato. The seasonal fluctuations in the retail prices of about 50 essential commodities reveal that generally the prices showed marginal decrease during the first quarter, an upward trend from April to August and a mixed trend during the remaining months of the year.

Kerala's economy is heavily dependent on outside supplies for a large variety of consumer goods to meet the growing requirements of its population. Thus it is not immune from the impact favourable or otherwise of the developments in the nation's economic system. It could be seen that persistent price increase of a wide range of commodities, imposes severe strain on the price structure within the State.

Studies on family living conditions have a history lasting over a century. The enquiry into the living conditions of the London Working Class initiated in 1886 was probably the first outstanding work in this field. Similar surveys conducted subsequently made further contributions to the methodology adopted in the analysis of expenditure of families. However, these enquiries were first carried out in an empirical manner and they acquired some scientific rigour only with the introduction of the sampling and interview techniques early in the 20th century. Enquiries conducted in France and Germany were of considerable value in the development in the techniques and methodology in such statistical studies. The findings of these

TABLE VI

Average Retail price of Essential Commodities

Commodity	Unit	Price at the end of of December		Percentage of variation
		1984	1985	1985 over 1984
1. Rice	Kg.	3.51	4.13	(+)17.7
2. Green gram	,,	7.12	6.75	(—) 5.2
3. Black gram	,,	6.69	6.76	(+) 1.0
4. Red gram	,,	5.16	6.66	(+)29.1
5. Dhall	,,	8.19	7.91	(—) 3.4
6. Coconut Oil	,,	36.78	17.06	(—)53.6
7. Groundnut Oil	,,	19.01	17.81	(—) 6.3
8. Refined Oil	,,	28.28	27.49	(—) 2.8
9. Tapioca	,,	1.00	1.38	(+)38.0
10. Banana—Green	,,	3.65	3.95	(+) 8.2
11. Milk (Cows)	Litre	3.90	4.25	(+) 9.0
12. Egg (Hen's)	Dozen	7.16	7.26	(+) 1.4

13.	Potato	Kg.	2.25	2.75	(+)22.2
14.	Coriander	,,	8.24	11.83	(+)43.6
15.	Chillies	,,	23.30	17.65	(—)24.2
16.	Onion	,,	2.09	2.07	(—)1.0
17.	Sugar	,,	5.50	5.90	(+)7.2
18.	Coconut (without husk)	100 Nos.	337.50	146.00	(—)56.7
19.	Firewood (local split)	Quintal	55.30	60.00	(+)8.5
20.	Washing soap (Sunlight Bar)	Each	3.34	3.70	(+)10.8
21.	Electric Bulb (Osram 40W)	,,	4.62	4.70	(+)1.7
22.	Aluminium cookingpot	Kg.	50.10	50.80	(+)1.4
23.	Baby Food (Amul)	,,	44.12	45.62	(+)3.4

Source: Directorate of Economics & Statistics.

TABLE VII

Statement showing the Monthly State Average Retail Prices of Essential Commodities for the Year 1985

(Prices at the end of the month)

Sl. No.	Commodity	Unit	January	February	March	April	May	June	July
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1.	Rice O.M.	Kg.	3.67	3.63	3.57	3.75	3.99	4.29	4.42
2.	Green gram	,,	7.26	7.42	7.33	7.45	7.42	7.41	7.46
3.	Black gram	,,	6.94	6.78	6.73	6.72	6.66	6.59	6.68
4.	Red gram	,,	5.26	5.37	5.35	5.42	5.57	5.64	5.87
5.	Dhall	,,	8.15	7.88	7.56	7.53	7.45	7.43	7.43
6.	Coconut Oil	,,	34.71	26.72	25.27	23.25	22.36	20.19	20.15
7.	Groundnut oil	,,	19.46	18.78	18.53	18.45	18.11	17.74	17.81
8.	Refined Oil Postman	,,	27.71	27.71	27.57	27.50	27.35	27.34	26.99
9.	Gingelly Oil	,,	20.92	20.33	20.19	20.19	19.77	19.00	19.02
10.	Tapioca-raw	,,	1.02	1.01	1.01	0.95	1.08	1.08	1.16
11.	Chenai	,,	1.98	2.05	2.03	2.30	2.50	2.70	2.56
12.	Banana-green	,,	3.54	3.47	2.76	3.16	4.10	4.71	4.77
13.	Milk-cows	Litre	3.90	3.90	3.90	3.90	3.90	3.90	3.94
14.	Egg—Hens	doz.	7.12	6.05	6.60	5.94	7.27	6.56	7.00

15.	Mutton	Kg.	24.30	24.70	24.90	25.10	25.40	25.80	26.00
16.	Potato	,,	2.08	2.13	1.92	1.91	2.32	2.74	2.55
17.	Coriander	,,	8.59	9.01	9.11	9.47	10.30	10.80	11.45
18.	Chillies	,,	23.00	14.80	17.80	19.00	19.75	21.10	21.30
19.	Onion	,,	1.58	1.78	1.98	2.37	2.41	2.89	2.43
20.	Tamarind	,,	13.20	11.50	10.70	10.50	10.40	9.90	10.00
21.	Tea BBA Dust	,,	39.90	41.09	41.24	41.25	41.26	41.27	41.30
22.	Coffee-Powder BB Family Brand	,,	28.80	28.72	28.72	28.52	28.57	28.42	28.22
23.	Sugar O.M.	,,	5.50	5.21	5.93	5.87	6.08	6.70	7.83
24.	Coconut without husk	100 Nos.	316.00	267.00	229.50	209.00	189.00	165.50	160.00
25.	Tobacco	Kg.	17.81	17.88	18.13	18.13	18.38	18.62	18.75
26.	Firewood Local split	Qtl.	55.30	55.60	55.50	55.40	55.40	56.10	54.20
27.	Mundu-Mull	Each	16.54	16.22	16.25	16.31	16.64	16.62	16.65
28.	Mundu-Kora	Each	11.59	11.74	11.78	11.66	12.40	12.40	12.49
29.	Paper	24 sheet	2.99	2.94	2.97	2.97	3.02	3.07	3.07
30.	Washing Soda	Kg.	5.36	5.36	5.54	5.65	5.82	6.38	6 39
31.	Washing Soap-Sunlight	Each	3.45	3.45	3.45	3.45	3.55	3.63	3.73
32.	Toilet Soap-Lux	,,	2.87	2.86	2.87	2.87	2 87	2.87	2.87
33.	Razor Blade	5 Nos.	1.72	1.72	1.72	1.72	1.73	1.73	1.72

TABLE VII—(Contd.)

Sl. No.	Commodity	Unit	August	September	October	November	December	Yearly average
(1)	(2)	(3)	(11)	(12)	(13)	(14)	(15)	(16)
1.	Rice O.M.	Kg.	4.54	4.29	4.22	4.23	4.13	4.05
2.	Green gram	,,	7.31	6.39	6.51	6.52	6.75	7.10
3.	Black gram	,,	6.73	6.72	6.83	6.72	6.76	6.74
4.	Red gram	,,	6.81	6.78	6.75	6.67	6.66	6.01
5.	Dhall	,,	7.54	7.52	7.69	7.77	7.91	7.66
6.	Coconut Oil	,,	18.11	17.79	18.22	17 55	17.06	21.76
7.	Groundnut oil	,,	17.91	17.68	17.74	17.61	17.81	18.14
8.	Refined Oil Postman	,,	26.90	26.90	26.90	26.99	27.49	27.28
9.	Gingelly Oil	,,	18.47	18.17	18.40	18.56	18.90	19.33
10.	Tapioca-raw	,,	1.13	1.18	1.22	1.34	1.38	1.13
11.	Chenai	,,	2.29	2.05	2.15	2.07	2.07	2.23
12.	Banana-green	,,	5.67	4.38	4.49	3.93	3.95	4.08
13.	Milk-cows	Litre	3.94	3.99	4.18	4.18	4.25	3.99
14.	Egg—hens	doz.	6.96	6.14	6.49	7.49	7.26	6.74

15.	Mutton	Kg.	26.40	26.40	26.70	27.50	27.90	25.93
16.	Potato	,,	2.46	2.32	2.37	2.62	2.75	2.35
17.	Corriander	,,	11.99	12.02	11.87	11.87	11.83	10.69
18.	Chillies	,,	21.95	19.20	18.55	17.60	17.65	19.31
19.	Onion	,,	2.32	1.71	1.99	2.04	2.07	2.13
20.	Tamarind	,,	9.60	9.40	9.60	10.00	10.20	10.42
21.	Tea BBA Dust	,,	38.72	40.29	39.34	38.47	37.79	40.16
22.	Coffee -Powder BB Family Brand	,,	28.83	29.00	28.85	30.83	30.23	28.98
23.	Sugar O. M.	,,	6.51	6.29	6.40	6.36	5.90	6.22
24.	Coconut without husk	100 Nos.	148.50	144.50	147.85	147.50	146.00	189.20
25.	Tobacco	Kg.	18.50	18.88	18.75	20.00	17.25	18.42
26.	Firewood Local split	Qtl.	54.40	55.60	55.90	56.80	60.00	55.85
27.	Mundu-Mull	Each	16.67	16.69	16.69	17.01	17.03	16.61
28.	Mundu-Kora	Each	12.49	12.49	12.49	12.60	12.55	12.22
29.	Paper	24 sheet	3.07	3.07	3.07	3.07	3.09	3.03
30.	Washing Soda	Kg.	6.46	6.58	6.59	6.45	6.40	6.08
31.	Washing Soap-Sunlight	Each	3.73	3.76	3.76	3.75	3.70	3.62
32.	Toilet Soap-Lux	,,	2.87	2.87	2.87	2.87	2.86	2.87
33.	Razor Blade	5 Nos.	1.72	1.72	1.77	1.77	1.80	1.74

TABLE VII (*Contd.*)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
34.	Tooth Paste—Colgate tube	50 grms.	4.23	4.23	4.23	4.26	4.23	4.24	4.24
35.	Anacin	2 tabs.	0.36	0.36	0.36	0.36	0.36	0.36	0.36
36.	Electric Bulb (Osram)	50 W Each	4.63	4.64	4.64	4.65	4.68	4.70	4.70
37.	Aluminium cooking pot	Each	50.10	50.10	50.10	50.30	50.80	50.80	50.80
38.	Cement	Bag	75.28	75.66	76.90	76.93	77.53	78.90	78.65
39	Baby Food (Amul)	Kg.	44.43	44.43	44.72	44.74	45.24	45.38	45.55
40	Torch Battery—Eveready	Each	3.22	3.22	3.20	3.20	3.23	3.31	3.31
41.	Onion big	Kg.	1.69	1.67	1.65	1.67	1.69	1.77	1.74
42	Brinjal	,,	2.68	2.23	2.68	2.68	3.13	3.04	3.10
43.	Pumpkin	,,	1.45	1.31	1.56	1.51	1.70	1.87	1.86
44	Cucumber	,,	1.49	1.27	1.27	1.18	1.68	2.50	3.00
45.	Ladies finger	,,	2.43	2.44	2.87	2.90	3.30	3.11	2.99
46.	Bitter gourd	,,	3.58	3.05	3.53	3.10	5.25	5.95	5.05
47.	Ash gourd	,,	1.31	1.14	1.12	1.16	1.23	1.48	1.69
48.	Colocasia	,,	2.22	2.58	2.74	2.88	3.80	3.90	3.79
49.	Chillies green	,,	5.85	4.10	3.85	5.00	6.95	5.70	5.10
50.	Plantatin green	,,	2.55	2.55	2.45	2.40	2.55	2.65	2.70

Source: Directorate of Economics & Statistics.

(1)	(2)	(3)	(11)	(12)	(13)	(14)	(15)	(16)
34.	Tooth Paste Colgate tube	50 grms.	4.24	4.24	4.24	4.27	4.31	4.25
35.	Anacin	2 tabs.	0.36	0.36	0.36	0 36	0.36	0.36
36.	Electric Bulb (Osram)	30 W Each	4.70	4.71	4.72	4.72	4.70	4.68
37.	Aluminium cooking pot	Each	50.80	50.80	50.80	50.80	50.80	50.58
38.	Cement	Bag	78.72	79.09	79.28	29.54	80.32	78.07
39.	Baby Food (Amul)	Kg.	45.69	45.87	45.97	45.97	45.62	45.30
40.	Torch Battery—Eveready	Each	3.31	3.32	3.30	3.29	3.25	3.26
41.	Onion big	Kg.	1.79	1.70	2.11	2.48	2.33	1.86
42.	Brinjal	,,	2.70	2.50	2.87	2.85	2.85	2.55
43.	Pumpkin	,,	1.85	1.62	1.64	1.72	1.67	1.65
44.	Cucumber	,,	1.77	1.61	1.80	2.21	2.05	1.85
45.	Ladies finger	,,	2 54	2.06	2.44	2.95	2.90	2.74
46.	Bitter gourd	,,	3.50	3.45	4 10	4.70	4.30	4.13
47.	Ash gourd	,,	1.63	1.54	1.42	1.43	1.50	1.39
48.	Colocasia	,,	3.75	3 17	3.00	3 00	2.62	3.12
49.	Chillies green	,,	5.60	4.30	4.80	4.95	3.85	5.00
50.	Plantatin green	..	2.90	2.98	2.73	2.85	2.80	2.67

studies concerning the poverty of the working class pointed to the need for more intensive and detailed investigation. The Statistical Surveys of many countries were thus increasingly concerned with the collection of complete information on living conditions of Working Class families.

The abnormal rise in prices associated with the First World War added a new dimension to such enquiries. Price inflation not only eroded the limited purchasing power of the workers whose emoluments were fixed in money terms, but also distorted seriously their consumption pattern. Accordingly deliable consumer price indices which involved the use of weights that could properly reflect the pattern of consumer expenditure of the affected population, had to be evolved. This led to further refinements in family living studies with a view to collect in reliable information on consumer expenditure which was necessary for computing the series of Consumer Price Index Numbers.

The consumer price index numbers are designed to play an important role in the life of a large section of the population whose wages are regulated by these index numbers. They are also of considerable interest to the employers who have to pay wages. The consumer price index shows over time the average percentage change in the prices paid by the consumers for a fixed list of goods and services consumed by them. The average percentage change measured by the index is calculated month after month with reference to a fixed period. This fixed period is known as the base period of the index. Since the object of the index is to measure the effect of price changes only, the price changes have to be calculated with reference to a fixed basket of goods and services of consumption. The index during the base is taken to be 100 so that indices for the later periods are expressed as percentages of the index during the base period. The index numbers are used for many purposes. One is the regulation of dearness allowance of employees to compensate for the rise in prices. At Government level, the index numbers function as an economic barometer, which helps to determine general economic policies particularly with respect to wages, prices etc. These are also used to measure the purchasing power of currency and real income of a particular population group. The index indicates that if the cost of the commodities and services in the fixed list of the base year was 100, how much it would cost during the reference year the consumption pattern remaining the same. The movements in the

price level in a year is reflected in the behaviour of the consumer price index during that year

The origin of family budget enquiries in India which were undertaken with the main object of collecting necessary background material for the construction of Consumer Price Index Numbers, dates back to the beginning of the present century. Here again the price escalation emerging from the First World War gave a fillip to the conduct of such enquiries among working classes as a preliminary to the measurement of the rising level in the cost of living. The recommendations of the Royal Commission on Labour in India (1931) gave an impetus to the conduct of family budget enquiries on more scientific lines—more especially the construction of consumer price index number series. Accordingly, family budget enquiries among the working class conducted by the Central Government in 28 important Industrial Centres during 1944-46, had more or less uniform basis.

With the implementation of the Minimum Wages Act (1948) the conduct of family survey gained a further dimension; the results of such surveys could be used in drawing up the standard of subsistence which in turn could be employed for fixing minimum wage rates. It also became imperative for Central and State Government to evolve consumer price indices for the employees in certain unorganised industries coming within the purview of the Act.

In Kerala, the Bureau of Economics and Statistics is responsible for the computation of the Working Class Consumer Price Index Numbers from selected centres in the State.

Initially, the Consumer Price Index Number used for the regulation of wages and dearness allowances formed two different series. For the Travancore Cochin portion of Kerala, a series started by the Government of the erstwhile Travancore-Cochin State with August 1939 as the base period was used while for the Malabar region an index series started by the Madras Government with the year ended June 1936 as the base period was used. The divergence in the base periods of the two series resulted in some anomalies in the fixation of dearness allowances of workers in the two regions. The base year in both the series was far removed from the current period. The consumption pattern of the working class underwent substantial alterations owing to the changes associated with the II World War and the process of economic development initiated in the post war period. Not only a stock of new

commodities and services was flowing into the economy but also the relative priorities and outlays on consumer goods were re-ordered.

Under the Minimum Wages Act 1948 the State Government have the power to fix the minimum wages and dearness allowance payable to employees in the scheduled industries, the dearness allowance being linked as nearly as practicable with the variations in the consumer price indices. The list of industries in the State which come under the coverage of the Minimum Wages Act 1948 is given in the Section on Wages.

On the recommendation of the Minimum Wages Advisory Board which is a statutory body to advise Government on matters connected with the fixation of minimum wages and payment of dearness allowance, the Bureau of Economics and Statistics launched a family budget enquiry under a committee of Direction. The survey was conducted in the following 13 centres of the State in 1965-66 (October-September).

1. Trivandrum
2. Quilon
3. Punalur
4. Alleppey
5. Kottayam
6. Munnar
7. Ernakulam
8. Chalakudy
9. Trichur
10. Palghat
11. Kozhikode
12. Meppadi
13. Cannanore.

The report was approved by Government. In the meanwhile representations were received from Trade Unions that "there was no occasion for them to make their case effective owing to the absence of their representatives on the committee". Government in their Order G. O. Ms. 60|67|Plg., dated 15-11-1967 appointed another Committee to recommend to Government additions or changes, if any, as are necessary for the preparation of a new series of Working Class Cost of Living indices and regarding the base recommended by the Committee of Direction.

In its report the Committee among other things recommended that a new series of Index Numbers may be prepared with 1970 as base year and that a fresh family budget survey be conducted during 1969-70 to ascertain the new weighting diagram.

Subsequently a fresh Family Budget Survey of working class households was conducted in the State during 1970-71, with 1970 as base year, in 15 selected centres which included Mundakayam and Malappuram in addition to 13 centres surveyed earlier.

The basket of commodities included in the present index was substantially enlarged to cover 92 commodities under food, lighting, clothing and other items. The Government decreed in 1975, that the new Index Series with 1970 as the base might be published discontinuing the old series. Accordingly the Consumer Price Index Numbers for the above 15 centres with 1970 as the base year are being published from August 1975.

A scrutiny of the consumer price index numbers in selected towns of Kerala during the period 1956-1975 reveals the pronounced rise in the indices in all the centres.

The price increase within the State during 1974 was very large as well as all pervasive—in this respect, most eventful year since independence. Although inflation had been generally rewarding to certain sections of the community this rise in prices brought about considerable decline in real income, especially to the weaker sections of the community.

During the year 1974 an increase of 346 points was registered in the average of the working class consumer price index numbers for Kerala which represented an increase of 31.6% over the preceding year. It is to be noted that this unusual increase was on the top of an increase of 20.6% during the previous year. The average price index moved up by 52 points in 1972 and by 187 points in 1973. The spurt in rise of consumer price index numbers was mainly due to the sharp rise in the prices of rice, the major component of the consumer expenditure of the working class.

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TABLE VIII

Consumer Price Index Numbers, Kerala

Sl. No.	Centre	1956	1961	1966	1971	1972	1973	1974
1.	Trivandrum	389	474	675	871	925	1,105	1,443
2.	Quilon	384	493	686	849	903	1,090	1,445
3.	Punalur	387	473	644	836	881	1,075	1,430
4.	Alleppey	381	461	688	854	900	1,079	1,420
5.	Changanacherry	384	468	691	851	904	1,094	1,443
6.	Kottayam	375	470	689	872	927	1,117	1,451
7.	Alwaye	378	479	676	858	914	1,112	1,447
8.	Ernakulam	391	493	698	881	933	1,121	1,459
9.	Trichur	374	484	699	872	928	1,112	1,453
10.	Chalakudy	388	489	686	869	923	1,110	1,455
11.	Munnar	381	477	604	823	884	1,078	1,444
12.	Shertalai	..	451	664	843	884	1,060	1,414
13.	Kozhikode	438	501	736	956	1,020	1,222	1,622
	*Kerala	383	478	673	857	909	1,096	1,442

* State average for twelve centres excluding Kozhikode base for Kozhikode is average prices for the year ended June 1936=100

Base for other centres is August 1939=100

Source: Directorate of Economics & Statistics, Trivandrum

The monthly average of consumer price index rose from 1,221 in December 1973 to 1,246 in January 1974 and advanced steadily and reached an all time high of 1,529 in September 1974. The index witnessed a fall in October 1974 and stood at 1,493. Again the index shot up to 1,578 in November 1974 to be followed by a slight decline of 2 points in December 1974. The maximum increase in the index during the year was noticed in the months of May and November. The most potent cause for the steep rise in index points was the increase in the prices of foodgrains. The increases registered in the index points, group-wise, are furnished below:

TABLE IX

Increase in Index Points

Group	*Jan. to Dec. 1973*	*Jan. to Dec. 1974*
Food articles	399	464
Housing	50	199
Clothing	196	321
Miscellaneous	35	109

The period of four years from 1976 to 1979 is note worthy for huge fluctuations in the level of prices of some essential commodities, as is seen from the following consumer price index numbers for the various Centres of Kerala State for those years and also for the year 1975 given for comparison.

TABLE 10

(Base: 1970=100)

Centre	1975	1976	1977	1978	1979
Trivandrum	179	164	160	166	179
Quilon	181	167	163	167	179
Punalur	182	165	160	161	173
Alleppey	180	164	159	161	173
Kottayam	174	158	154	162	175
Mundakayam	184	167	156	158	170
Munnar	189	175	172	175	186
Ernakulam	176	161	158	162	171
Chalakudy	176	164	157	165	178
Trichur	175	163	158	166	179
Palghat	171	163	160	163	175
Malappuram	174	162	161	164	178
Kozhikode	179	166	163	170	181
Meppadi	181	167	165	170	183
Cannanore	174	161	157	164	175

(The 1975 index given for each centre is the average of only 5 months from August 1975 to December 1975 whereas the index for all other years is the average of 12 months).

During the year 1976 there was heavy fall of 14 points on an average in the index number in all the selected centres compared to previous year 1975. In the next year 1977 there was again a fall in the index number to the tune of about 4 points. But the year 1978 shows an increase of 4 index points, levelling off almost at the 1976 level. The figures for the year 1979 reveals a sharp upward surge in consumer prices, raising the index number by 12 points on an average from the level of previous year to almost the level of 1975. Thus the fall the index number from the level of 1975 continued, though with slight fluctuations, during the years 1977 and 1978 and the index of consumer goods prices of the year 1979 has levelled off at the 1975 level. This fall or rise in the index number is due to the fluctuations in the price level of consumer goods prevailed in various centres of the State during those years.

From January 1976 onwards the consumer price index number in Kerala showed a down ward trend. This trend was noticed in all the selected centres in the State for which these indices are being computed. By the end of the year 1976 the index fell by 9 points in most of the centres from level at the beginning of the year. During the year 1977 also the declining trend continued and the index number at the end of the year reached a lower level in most of the centres. But during the succeeding year 1978 there has been a reversal in the trend and the index at the end of the year increased by 6 points on an average from the position at the end of the previous year in most of the centres. In the year 1979 there was huge increase in the index at all the centres of the State, which became more pronounced during the second half of the year, rising by about 23 points at the end of the year from the level at the end of the previous year. The following figures reveal the change in consumer price index numbers for the various centres of the State from January 1976 to December of each year 1976, 1977, 1978 and 1979.

TABLE 11

(Base: 1970=100)

Centre	1976 *January*	1976 *December*	1977 *December*	1978 *December*	1979 *December*
Trivandrum	173	162	161	171	194
Quilon	173	164	164	171	192
Punalur	173	163	159	162	190
Alleppey	173	162	160	164	187
Kottayam	166	157	156	163	188
Mundakayam	177	162	156	163	182
Munnar	181	175	175	177	200
Ernakulam	169	160	159	164	183
Chalakudy	169	161	159	168	191
Trichur	168	161	160	169	193
Palghat	168	163	163	164	187
Malappuram	168	161	164	167	191
Kozhikode	171	164	164	174	193
Meppadi	173	165	169	172	195
Cannanore	167	158	158	165	187

In response to some complaints that the present consumer price index numbers were not reflecting the true State of affairs a new Committee was constituted in August 1977 to go into the various aspects of consumer price index numbers and to make recommendations. This Committee *inter alia* recommended that a fresh family budget survey in 1980 and collection of base price concurrently. A Committee on direction was constituted and a fresh Family Budget Survey was undertaken in the existing 15 centres in the State. The survey has now been completed and based on the report under consideration, Government has decided to empower the Director of Economics and Statistics as the competent authority to ascertain from time to time and declare the Consumer Price Index Numbers for industrial and agricultural workers with the year 1981-82 as base which will be applicable to employees in the various scheduled employment under clause (C) of section 2 of the Minimum Wages Act (Central Act 11 of 1948).

The table given below shows the average annual index of Consumer Price in the different centres in the State for the years from 1976 to 1982. The annual variation in index numbers are indicated below:

TABLE 12

Consumer Price Index

(Variation over the present year given in brackets)

Average Annual Index

Sl. No.	*Centre*	1976	1977	1978	1979	1980	1981	1982
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	Trivandrum	164	160 (—4)	166 (+6)	179 (+13)	204 (+25)	229 (+25)	242 (+13)
2	Quilon	167	163 (—4)	167 (+4)	179 (+12)	206 (+27)	235 (+29)	249 (+14)
3	Punalur	165	160 (—5)	161 (+1)	173 (+12)	199 (+26)	222 (+23)	237 (+15)
4	Alleppey	164	159 (—5)	161 (+2)	173 (+12)	199 (+26)	229 (+30)	241 (+12)
5	Kottayam	158	154 (—4)	162 (+8)	175 (+13)	202 (+27)	229 (+27)	224 (+15)

TABLE 12 (Contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6	Mundakayam	167	156 (—11)	158 (+2)	170 (+12)	193 (+23)	224 (+31)	237 (+13)
7	Munnar	175	172 (—3)	175 (+3)	186 (+11)	208 (+22)	234 (+26)	241 (+7)
8	Ernakulam	161	158 (—3)	162 (+4)	171 (+9)	196 (+25)	223 (+27)	235 (+12)
9	Chalakudy	164	157 (—7)	165 (+8)	178 (+13)	201 (+23)	230 (+29)	242 (+12)
10	Trichur	165	158 (—5)	166 (+8)	179 (+13)	206 (+27)	234 (+28)	244 (+10)
11	Palghat	163	160 (—3)	163 (+3)	175 (+12)	199 (+24)	225 (+26)	239 (+14)
12	Malappuram	162	161 (—1)	164 (+3)	178 (+14)	202 (+24)	228 (+26)	237 (+9)
13	Kozhikode	166	163 (—3)	170 (+7)	181 (+11)	204 (+23)	229 (+25)	242 (+13)
14	Meppady	167	165 (—2)	170 (+5)	183 (+13)	206 (+23)	233 (+27)	247 (+14)
15	Cannanore	161	157 (—4)	154 (+7)	175 (+11)	193 (+23)	225 (+27)	237 (+12)
	State Average	164	160 (—4)	165 (+5)	177 (+12)	202 (+25)	229 (+27)	241 (+12)

The table reveals that the average Consumer Price Index for the State after looking down a little has been steadily increasing year by year. The total increase for the Index from 1976 to 1982 was 77, namely 164 in 1976 to 241 in 1982. This steady increase over years is reflected in all the centres.

The consumer price index did not show any serious inflationary trend during 1985 in contrast to earlier years. The rate of increase in the price index at the 15 centres in the State was within the range of 0 to 5.3%. Mundakayam and Kozhikode respectively accounted for the minimum (0.3%) and maximum (5.7%) increase in the annual average price index.

TABLE 13

Average Consumer Price Index Number (Cost of living Index in Selected Centres of Kerala)

(Base 1970=100)

Sl. No.	Centre	Average Annual Price Index 1983	1984	1985	Percentage variation 1984 over 1983	1985 over 1984
1	Trivandrum	275	311	321	13.09	3.22
2	Quilon	285	318	329	11.58	3.46
3	Punalur	275	303	308	10.18	1.65
4	Alleppey	276	303	311	9.78	2.64
5	Kottayam	275	311	322	13.09	0.54
6	Mundakayam	272	297	298	9.19	0.34
7	Munnar	266	294	307	10.53	4.42
8	Ernakulam	263	293	303	11.41	3.41
9	Chalakudy	279	305	314	9.32	2.95
10	Trichur	276	306	317	10.87	3.59
11	Palghat	274	306	309	11.68	0.98
12	Malappuram	270	308	317	14.07	2.92
13	Kozhikode	270	300	317	11.11	5.67
14	Meppady	277	309	322	11.55	4.21
15	Cannanore	265	300	311	13.21	3.67
	State	273	304	314	11.3	3.29

The annual average consumer price index increased only marginally by 3.3% from 304 points in 1984 to 314 points in 1985, whereas the corresponding increase was 12.8% and 11.4% in 1983 and 1984 respectively. The monthly variations in the consumer price index numbers at different centres were also marginal in 1985 implying the absence of any major inflationary trend during the year. Though the monthly variations were marginal in terms of their magnitudes, the price indices as for their direction, showed a downward trend in the first quarter, increasing trend from April to July and a mixed trend in the later part of the year. (Table next page).

TABLE 14

Consumer Price Index (Cost of Living Index) Number for Agricultural and Industrial Workers
Kerala-1985

(Base 1970 = 100)

Centre	January	February	March	April	May	June	July	August	September	October	November	December
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Trivandrum	323	320	316	316	318	321	324	324	321	322	324	327
Quilon	330	327	325	325	327	[illegible]	334	334	330	328	328	331
Punalur	310	306	302	302	304	307	311	313	312	311	311	312
Alleppey	311	308	304	304	307	310	314	314	311	313	315	318
Kottayam	318	316	315	315	318	328	[illegible]	326	324	324	326	329
Mundakayam	298	295	291	291	294	298	303	304	300	298	300	301
Munnar	302	300	299	300	302	306	309	310	311	313	314	316
Ernakulam	302	301	298	298	301	305	308	[illegible]	305	303	303	305
Chalakudy	307	305	304	306	310	315	318	318	319	321	323	325
Trichur	313	309	308	310	314	319	322	323	319	319	321	323
Palghat	312	308	304	304	306	310	314	314	309	307	307	308
Malappuram	317	314	312	313	316	319	322	322	318	316	318	321
Kozhikode	312	311	309	310	314	318	323	324	320	319	321	324
Meppady	316	315	314	316	318	321	324	325	325	327	328	330
Cannanore	309	306	303	305	305	308	312	316	316	314	316	317
State	312	309	307	308	310	314	316	318	316	316	317	319

Apart from the State Series of Consumer Price Index, the Labour Bureau of the Government of India functioning in Simla is computing consumer price Index Numbers for over sixty centres spread throughout India and also an all India Index. They conduct family living surveys of their own and have an independent price collection and supervision agency. The present series computed by the Labour Bureau has 1960 as base. This price index for industrial workers is considered as representative in as much as the compensations for rise in the cost of living of employees in the organised sector is determined on the basis of this index. The all India consumer price index for industrial workers is a weighted average of 50 centres spread all over India, with each State having at least one centre. The trends in consumer price index are generally taken as an appropriate proxy for the trends in retail prices. A study of the trends in the consumer price index over the last twenty five years indicates that there has been an acceleration of the rise in this index from decade to decade.

TABLE 15

Annual variations in consumer price index (1960 = 100)

All India and Mundakayam (April to March)

	All India	*Mundakayam*
Weight	*100.00*	*2.73*
1970-71	5.1	3.1
1975-76	1.3	2.7
1980-81	11.4	17.2
1985-86	6.5	2.0
Compound Growth rate between 1960-61 & 1985-86	7.6	7.5

The real value of money is nothing but its command over real resources in the form of goods and services and this is reflected in the price level. The value of the rupee is thus inversely proportional to the price level. A method usually adopted to measure the purchasing power of the rupee is to view it in relation to the movements in consumer price index. The trends in the real value of the rupee between the period 1970-1986, which have been worked out using the formula.

Base Year Consumer Price Index x 100
Current Year Consumer Price Index

Current Year Consumer Price Index are given below in respect of All India and Mundakayam. Unmistakably there has been a progressive deterioration in the rupee value from year to year. The real value of the rupee which was 53·7 paise and 50.76 paise in All India and Mundakayam respectively in 1970-71 declined to 24.94 and 25.25 paise in 1980-81 and to a further low of 16.13 paise and 68.5 paise in 1985-86. Thus in contrast to the All India picture the purchasing power of the rupee has been relatively better protected in Mundakayam.

However, a contrasting picture is presented in the analysis of the consumer price index provided by the Central Statistical Organisation (C.S.O.) during the year 1986 ended December which portrayed the highest rate of inflation in cities and towns (below a population of 1 million) of India in Trivandrum at 14.1% followed by Shillong 13.5% Indore, 12.3% Tiruchirapalli 11.2% and Kozhikode 11.1%. Similarly the Central Statistical Organisation figures indicated that the highest erosion in the value of the rupee was at Trivandrum, where it fetched only 13.72 paise in December 1986 against 16.08 paise at the All India level.

Wages

The general level of wages have moved in tune with the fluctuation in the prices of essential commodities. In the initial stages Agricultural wages were largely determined by customs, payment being made in kind rather than cash. This aspect struck Ward & Conner who in their "Memoir of the Survey of Travancore and Cochin" * remarked "wages are so trifling that even the poorest people found it more advantageous to labour on their own account for at least a portion of the year and there was an abundance of Sirkar lands for cultivation. 3 Edangazhies of unhusked rice and 1 meal was esteemed a fair hire for a days work; on an average 8 hours this would amount to Rs. 2 a month". The main agricultural labour force then comprised of the Scheduled Castes and Tribes who were virtually slaves tied to the soil. They had no freedom to leave the land of their masters and were even sold along with the

* Memoir of the Survey of the Travancore and Cochin State Lt: Ward & Conner—1863, p. 62.

land to the new owners. However they enjoyed a type of minimum security as they were given a daily wage throughout the year irrespective of having worked or not. They were also given cloth and coconut oil on festive occasions like Onam and Vishu. Further meagre monetary contributions were received by them to meet expenditure incurred for marriage, birth and funeral ceremonies and other celebrations. Gradually with increasing monetisation of the economy agricultural labourers who received their wages in kind began insisting on payment in cash. The system of payment of wages in kind has virtually become extinct. The First World War and the period immediately succeeding that event witnessed an increase in wages which trend being reversed during the great depression. During the decade 1931-40, the wages of an ordinary field labourer was about 31 ps. in the southern region of the State. The low wage rate in the agricultural sector probably accounted for the diminution of the number of agricultural workers during the period 1931-40. The advent of the II World War altered the wage structure considerably. Thus in the decade 1941 to 1950, the daily wage of an unskilled worker rose from 31 ps. to Rs. 2. It was in this period that Trade Union movement entrenched itself firmly with a favourable impact on the wage level. Under the provisions of the Minimum Wages Act 1948 (Central Act XV of 1948) minimum rates of Wages have been statutorily fixed by Government for different categories of employees, the contravention of which by the employers leads to legal conviction and penalty.

Most of the agricultural labourers do not possess land and they are not properly organised. They are not gainfully employed all through the year and the wages they get are much lower than that of wages in other sectors of the economy. Security of employment, fixity in working hours, share in the profits and labour welfare laws are not applicable to agricultural labourers in the manner and degree as they are applied to industrial labourers. The reason for this lies mainly in the peculiar nature of agricultural operations. Agricultural work is closely related to certain seasons and even during these seasons agricultural work may not be of a continuous nature. Hence the difficulty in organizing agricultural operations. The rates of wages alone cannot give an idea of the standard of living of the agricultural worker; the seasonal character of his employment also has to be taken into account.

In 1950-51 and 1956-57 two intensive studies were made on the socio-economic conditions of agricultural labourers in the

country. These studies throw light on the unemployment, income and expenditure, indebtedness etc., of the agricultural labourers. These studies indicate that nearly 85% of the agricultural labourers in India were working for wages while others were attached to landlords and were serving more or less as bonded labourers. The Agricultural labour enquiries revealed that nearly a third of the total number of agricultural workers were in excess of requirements. The worker participation rates of females is quite high in the agricultural sector. The findings of the Agricultural labour enquiries and the rural labour enquiry conducted during the years 1950-51, 1956-57 and 1963-65 respectively shows that wage rates were comparatively higher in Punjab, Assam and Kerala.

TABLE 16

Average Daily Wage Rates of men in Agricultural operations (Rs.)

State	*1950—51	*1956—57	1964—65
India	1.09	0.96	1.43
Assam	1.09	1.54	2.21
Punjab-Haryana	1.84	1.98	2.13
Kerala	1.26	1.28	2.11
Tripura	..	..	1.97
Jammu & Kashmir	..	..	1.95
West Bengal	1.66	1.43	1.81
Rajasthan	1.23	0.98	1.76
Delhi	..	..	1.75
Gujarat-Maharashtra	1.01	0.87	1.47
Tamilnadu	0.97	0.84	1.39
Bihar	1.26	0.91	1.39
Orissa	0.72	0.80	1.33
Andhra Pradesh	0.97	0.87	1.21
Mysore	0.90	0.84	1.21
Madhya Pradhesh	0.79	0.76	1.11
Uttar Pradesh	1.18	0.92	1.10

* Relates to casual agricultural labourers only.

Source: Rural Labour Enquiry 1963-64 Final Report Labour Bureau, Government of India.

During olden days remuneration to agricultural workers was being paid mainly in kind. This practice is still being continued in some part of the State especially Palghat, Kuttanad regions while payments for harvesting charges are made. Though minimum wages rates have been fixed in the agricultural sector. The actual wage are determined by the free play of forces of demand and supply. The prevailing wage rates are comparatively higher in Kerala especially in the urban sector where the supply of agricultural labour is limited. However agricultural labourers are not gainfully employed all through the year and the wages they get are much lower when compared to the wage rates in other sectors of the economy.

Agricultural wages are comparatively higher in Kerala among the States in India. In the first half of the sixties agricultural wages in real terms in the country were generally low except in Kerala, Punjab and Tamilnadu. The average daily wage rate of an agricultural (Paddy field labour-men) increased from Rs. 1.85 in 1960-61 to Rs. 5.09 in 1970-71 and Rs. 11-13 in 1980-81, recording an average decadal variation of 250.81% i.e., an average increase of 25% per annum. An analysis of the agricultural wage rates in Kerala shows that the rate of increase in wages has been comparatively high among female labourers than male labourers as is evident from the figures given below.

TABLE 17

Index Numbers of Agricultural Wages in Kerala

(1952-53 = 100)

Year	Paddy field Labour		Other Agricultural Labour	
	Men	*Women*	*Men*	*Women*
1960	119.2	137.2	118.3	125.2
1970	315.8	365.1	319.2	369.4
1980	644.6	816.3	664.6	812.6
1981	755.1	936.6	772.7	994.2

The trend in the growth of agricultural wages in some of the Indian states in comparison with the trend in the growth of the consumer price indices for agricultural labourers during the period 1969-70 to 1978-79 is shown below. It can be seen that the earnings of agricultural labourers in Kerala in real terms have declined during this period.

TABLE 18

Agricultural Wages (Men)

State	Field labour		Other Agricultural labour	
	1969-70	1978-79	1969-70	1978-79
Andhra	2.59	4.65	2.59	4.52
Assam	3.74	6.08	3.81	5.91
Maharashtra	2.11	5.69	2.98	6.19
Tamilnadu	3.03	4.00	2.00	5.40
West Bengal	2.92	6.27	2.67	4.18
Kerala	4.80	7.32	3.81	8.21

TABLE 19

Trends in Wages & Cost of Indices in the Agricultural Sector 1978-79

(Base 1969-70=100)

State	Wage Rates field labour Indices (Men)	Cost of Living Indices	Parity Indices
Andhra	179.43	160.23	112.05
Assam	162.50	178.49	91.08
Maharashtra	181.21	172.68	104.94
Tamilnadu	132.01	156.32	84.45
West Bengal	214.73	166.67	128.84
Kerala	152.50	160.40	95.07

An analysis of the trends in wage rates conducted by the Centre for Development Studies at Trivandrum, as part of the research work commissioned by the United Nation's Secretariat from outside institutions on behalf of the committee for Development Planning (1975) throws interesting light on the wage pattern in Kerala. The findings of the study are briefly summarised below. The daily wage rate of agricultural labour has be n higher in Kerala than in most other States of India, partly reflecting the higher price of food-grains and partly perhap. due to supplementary income from other sources (small holdings of land, petty trade, etc.,) raising its reserve price. Kerala is also one of the few States in India in which the real wage rate appears to have risen; this has been attribut d to Unionization of agricultural labour and collective bargaini . However there is also some evidence to suggest that oth factors helping to raise the reserve price of labour (e.g., land reforms giving fixity of tenure on small holdings) could have been equally important. A study in 1970 of movements of real wage rates in Intensive Agricultural Development Programme (IADP) districts of various States between 1962-63 and 1967-68 (which in Kerala were the districts of Alleppey and Palghat) showed that the daily wage rates among male agricultural labourers recorded a higher percentage increase in these two districts than in any of the other IADP districts in India, even though much higher increases in agricultural production were recorded in other States.

Currently more than 81% of Kerala's population reside in rural areas and a considerable portion of the population depend on agriculture and allied activities for their livelihood. According to the 1981 census 41% of the main workers in Kerala are engaged in agriculture and 38% of the State domestic products come from the agricultural sector. Realising the importance of agriculture and agricultural labour force in the economy, a comprehensive survey on Socio-economic conditions of the agricultural and other rural labourers was conducted in the State during 1983-84 (August-July). The survey gathered information on wage earnings of each rural labour during the previous 365 days and the last 30 days of the date of survey was also collected. Income earned by the agricultural labourer and other labourers from all gainful activities during the week prior to the date of the survey was also collected. It was seen that the average daily earnings of a male agricultural labourer was Rs. 16 and that for females Rs. 11. As regards, other

TABLE 20

Average Daily Wage earnings of Rural Labourers according to type of Households

State/District	Labour Status	ALHH			ORLHH			ALL RLHH		
		M	F	T	M	F	T	M	F	T
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
State	AL	15.92	10.86	14.22	16.02	10.83	13.57	15.93	10.86	14.15
	ORL	16.50	11.86	14.38	18.03	12.63	16 74	17.87	12.55	16.42
	Total	15.99	11 04	14 24	17.87	12.28	16.40	16.99	11.57	15.32
Trivandrum	AL	16.35	13.08	15.65	16.74	11.43	16.13	16.47	12.80	15.78
	ORL	18.60	14.09	16.61	18.61	13.13	17.06	18.61	13.28	17.02
	Total	16.64	13.38	15.82	18.22	13.00	16 90	17.66	13.13	16.51
Quilon	AL	16.95	11.83	15.79	15.10	11.63	14 47	16.77	11.81	15.67
	ORL	16.91	11.05	13 01	17.76	12.00	15.77	17.67	11.71	15.27
	Total	16.95	11.50	15 23	17 49	11.98	15.66	17.22	11.75	15.45
Alleppey	AL	17.48	10.31	15.20	17.68	10.99	13.90	17.49	10.40	15.09
	ORL	17.89	13.29	14 95	18.56	13.04	16.40	18.51	13.08	16.24
	Total	17.52	11.14	15.16	18.52	12.88	16.26	18.09	12.18	15.80

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Idukki	AL	13.91	12.38	13.27	13.04	11.35	10.86	13.90	12.33	13.35
	ORL	13.81	12.35	13.41	18.88	13.47	17.39	17.61	13.19	16.88
	Total	13.91	12.38	13.28	18.68	12.84	16.67	14.44	12.42	13.68
Kottayam	AL	14.15	10.72	13.57	15.87	10.65	13.66	14.22	10.70	13.57
	ORL	16.11	12.76	14.38	17.08	13.99	16.71	16.96	13.36	16.26
	Total	14.30	11.34	13.67	17.00	12.03	16.40	15.35	11.89	14.68
Ernakulam	AL	16.50	11.18	14.74	15.56	9.12	17.64	16.45	10.84	14.44
	ORL	17.90	11.84	16.06	18.39	12.20	17.64	18.36	12.14	17.54
	Total	16.68	11.26	14.90	18.34	11.57	17.36	17.85	11.40	16.50
Trichur	AL	18.32	12.18	15.63	17.63	13.18	14.37	18.25	12.43	15.42
	ORL	15.96	11.99	14.47	19.33	14.06	18.24	19.04	13.70	17.85
	Total	17.97	12.16	15.47	19.25	13.76	17.74	18.78	13.03	16.78
Palghat	AL	11.82	8.53	10.23	11.79	8.69	9.59	11.81	8.55	10.15
	ORL	13.19	8.94	12.15	13.87	9.49	13.15	13.74	9.34	12.93
	Total	12.07	8.56	10.49	13.72	9.10	12.50	12.85	8.71	11.26

Malappuram	AL	16.53	11.57	15.03	17.09	11.08	13.62	16.56	11.47	14.87
	ORL	17.69	12.42	16.54	17.78	11.66	16.61	17.77	11.75	16.60
	Total	16.71	11.66	15.24	17.74	11.53	16.34	17.30	11.59	15.85
Kozhikode	AL	16.48	12.15	15.79	16.81	11.97	14.66	16.49	12.12	15.73
	ORL	18.67	9.84	15.52	18.55	13.20	18.06	18.84	12.92	17.97
	Total	16.56	11.89	15.78	18.80	13.07	17.94	17.93	12.57	17.09
Wynad	AL	17.20	11.40	14.53	13.01	11.08	11.74	17.12	11.37	14.29
	ORL	18.01	11.09	12.85	20.30	16.39	19.15	20.19	15.00	18.38
	Total	17.21	11.38	14.48	19.83	14.31	17.68	17.76	11.86	15.09
Cannanore	AL	17.02	9.68	14.41	15.02	10.33	12.63	16.87	9.76	14.24
	ORL	17.15	11.46	13.87	18.36	12.23	16.10	18.07	11.90	15.39
	Total	17.04	10.25	14.29	17.97	11.87	15.61	17.38	10.82	14.76

AL : Agricultural Labour Household.

ORL: Other Rural Labour Household.

rural labourers, the average daily wage earnings for males was Rs. 18 and that for females Rs. 13. In all the districts it was found that the earnings in an agricultural labour household was less than that of 'other rural labour' household. At the State level the average daily earnings, for agricultural labour household and other rural households were Rs. 14 and Rs. 16 respectively. Among the average daily wage earnings below the State average of Rs. 14 was in the districts of Idukki Rs. 13 and Palghat Rs. 10. The districts in which the average daily wage earnings of other rural households are below the State average of Rs. 16 are Quilon Rs. 15.27 and Palghat Rs. 12.94 and Cannanore Rs. 15.39.

The introduction of the Agricultural Worker's Pension Scheme is an innovative labour welfare measure. This Scheme implemented with effect from April 1, 1980 provides for payment of a monthly pension of Rs. 45 to agricultural workers who have completed 60 years of age and whose annual income does not exceed Rs. 1,500 (in calculating such income the income of the applicant including husband|wife|unmarried adult sons and daughters if any shall also be taken into account). An agricultural worker other than a worker covered by the Plantation Labour Act depending principally on wages for a livelihood and residing in the State for a continuous period of at least 10 years preceding the date of application for pension is eligible for the pension. Agricultural workers who owing to old age or physical infirmity are not employed as agricultural workers will also be eligible for pension if they are otherwise eligible under the scheme. The application for pension shall be submitted to the village officer in whose jurisdiction the applicant is a resident. The village officer after making necessary enquiries and recording his certificate in the application shall forward the same to the Deputy Labour Officer attached to the office of the District Labour Officer. The Deputy Labour Officer will sanction the pension and the same will be sent to the pensioner by money order.

The Minimum Wages Act of 1948 is a landmark in the history of labour legislation in India. The Act requires the Central and State Governments to fix minimum wages rates payable to employees in different scheduled occupations. Even though the minimum wage has been recommended as the need based minimum wage, in actual practice the main factors considered by the wage fixing authorities both at the Centre

and at the States have been (a) prevailing rates of wages (b) rise in price and (c) minimum rates of wages fixed for similar scheduled employments in the same State or in the neighbouring States. However it has been agreed by the State Labour Ministers that the minimum wages should not be below the poverty line as defined by the Planning Commission—Rs. 52 and Rs. 71 per capita per month for rural and urban areas respectively at 1976-77 prices on the basis of recommended nutritional requirements of 2,400 calories. The following occupations have been covered under the Minimum Wages Act 1948 in Kerala.

Occupations covered in Kerala under the Minimum Wages Act, 1948

1. Woolen Carpet making or Shawl making establishment
2. Tobacco including Beedi
3. Rubber Plantations.
4. Tea, Coffee or Cardamom
5. Local bodies
6. Oil Mills
7. Construction or maintenance of roads
8. Stone-breaking or Stone-crushing
9. Ice Manufacturing
10. Rice Mills
11. Public Motor Transport
12. Tanneries and leather manufacturing
13. Cashew Manufacturing
14. Coir Manufacturing
15. Tile Manufacturing
16. Toddy tapping
17. Match Industry
18. Any Bank
19. Timber and Plywood
20. Bricks
21. Handloom

22. Shops and Establishments
23. Plywood
24. Minor Ports
25. Construction of Dams
26. Rubber Products Industry
27. Minor Engineering
28. Fish Industry
29. Salt Pan
30. Manufacture of Ayurvedic and Allopathic Medicines
31. Powerloom Industry
32. Drying of Coconuts and Copra Industry
33. Ice Factory
34. Manufacture and sale of umbrella
35. Rubber Crepe Mills
36. Hosiery Manufacturing
37. Forest
38. Agriculture
39. Hostels
40. Handling and care of elephants.

Industrial Sector

With the enactment of the Minimum Wages Act, 1948 a clear distinction was made between organised group of industries and 'sweated' industries and minimum rates of wages were fixed in the organised sector. The Act also provides for the creation and maintenance of machinery at Central and State levels regulating fixation and revision of minimum rates of wages in 'sweated industries'.

Wages in the factory sector are collected on the basis of the returns received from the factory owners as per the payment of Wages Act, 1936.

TABLE 21

Per capita earnings of factory workers

State	Per capita earnings	
	1971*	1972**
Andhra	7.02	11.32
Assam	5.71	13.97
Bihar	8.72	16.83
Gujarat	9.30	21.69
Karnataka	8.66	11.84
Kerala	7.03	16.11
Madhya Pradesh	9.63	22.40
Maharashtra	10.20	25.40
Orissa	9.09	22.96
Punjab	7.64	15.57
Rajasthan	8.11	16.14
Tamilnadu	8.52	19.31
Uttar Pradesh	8.33	17.86
West Bengal	10.03	24.51

* Relates to earnings less than Rs. 400 p.m.

** Relates to earnings less than Rs. 1000 p.m.

Legislations together with bargaining power of labour have contributed to a comparatively high level of wage rates in the industrial sector.

Industrial wages in Kerala are low when compared to many other Indian States. The trend in the per capita daily

earnings of factory workers (industry-wise) in Kerala during the last two decades is shown in Table No. 22.

TABLE 22

Per capita daily earnings of Factory Workers

Industry	1960	1970	1980	1983
Rice Mill	1.68	5.05	12.67	16.14
Sugar	..	9.05	19.31	40.32
Edible Oils	2.68	4.90	14.41	18.95
Tea Factories	2.41	4.12	14.61	17.84
Cashew Factories	1.25	3.35	9.88	13.84
Cotton textiles	3.13	7.12	21.35	24.89
Coir	2.63	7.55	16.78	19.00
Umbrellas	2.45	6.20	11.95	17.77
Saw Mills	2.97	5.78	13.93	20.14
Plywood	2.65	7.27 }		
Splints & Veneers	1.44	2.86 }	9.25	18.17
Furniture & Fixtures	3.11	9.36 }	18.90	21.58
Printing & Publishing	3.49	10.24	18.92	23.15
Tyres & Tubes	3.87	18.22	19.67	26.24
Rubber	2.80	6.97	18.68	26.90
Artificial Manure	4.26	4.99	37.00	46.94
Pharmaceuticals	3.73	6.56	23.72	23.42
Matches	2.43	2.10	8.03	10.63
Soaps	7.77	10.25	26.94	37.49
Bricks & Tiles	2.58	5.12	18.19	26.66
Pottery, China Clay and Earthernwares	2.94	7.08	17.45	27.61
Metal Products	3.13	7.44	20.32	32.33
General Jobbing Engineering	4.93	7.21	18.14	26.66
Electrical Machinery	3.94	9.87	26.94	44.89
Repair of Motor Vehicle	3.58	10.06	31.32	29.93
Sanitary Services	..	10.29	..	28.40

1960 & 1970—Earnings relate to less than Rs. 400 p. m.
1980 & 1983—Earnings relate to less than Rs. 1,000 p. m
Source: Statistics for Planning—1986.

Wage Structure Survey in Kerala

A survey on Wage Structure in the 'Construction' and 'Trade & Commerce' sectors in Kerala was initiated by the Directorate of Economics & Statistics in 1963-64 with the object of studying the trend of wages in these two sectors on an annual basis. The survey is being conducted on a random sample basis covering the entire State. The revenue districts form the basis of the survey.

The trend of wage rates of skilled labour in the construction sector is shown in Table No. 23.

TABLE 23

Wage Rates of Labourers in the Construction Sector

A. Skilled Labour

(Rs. per day)

Year		*Carpenter (1st class)*	*Mason (1st class)*	*Painter (1st class)*	*Sawyer*	*Plumber*	*Electrical Wireman*
1963–64	U	4.98	4.78	..	..	..	..
	R	4.59	4.51	..	..	..	..
1965-66	U	5.54	5.41	..	.	..	..
	R	5.03	5.01	..	..	..	..
1970-71	U	8.63	8.71	7.84	7.62	9.16	9.28
	R	8.19	8.20	6.22	7.19	8.29	8.31
1975-76	U	13.78	13.80	12.79	13.23	13.23	14.73
	R	13.30	13.25	12.46	12.94	12.90	14.04
1980-81	U	19.33	19.36	17.97	17.48	17.96	18.51
	R	18.66	18.75	18.08	16.80	18.08	18.06
1984-85	U	37.97	38.03	..	..	..	..
	R	36.71	36.65	..	..	..	..

U—Urban R—Rural

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Wage rates of skilled labour showed a steady increase during the period 1963-64 to 1980-81 and a sharp spurt after 1980-81. The rates were comparatively high in the urban sector than in the rural sector. It can be seen that wage rates have nearly trebled during the last decade (i. e., 1975-76 to 1984-85).

As regards unskilled labour, males were paid a higher wage rate than females. However, the rate of increase in wages is higher among females than for males. Between 1970-71 and 1980-81 the wage rates of an unskilled male labourer increased by about 120% while that of a female labourer went up by 161 per cent (See Table 24).

TABLE 24

Wage Rates of Unskilled Labourer

(Rs. per day)

Year	*Men*		*Women*	
	Urban	*Rural*	*Urban*	*Rural*
1963-64	2.93	2.53	2.09	1.73
1965-66	3.31	3.00	2.41	2.03
1970-71	5.71	5.40	3.92	3.68
1975-76	9.31	8.48	6.84	5.93
1980-81	13.07	12.30	10.22	9.62
1984-85	22.80	21.90	17.38	16.37

Trade and Commerce Sector

The Wage Structure Survey in the Trade and Commerce sector has been confined to the urban sector. All the district headquarters and one more municipality from each district were selected for the survey in the trade and commerce sector. Each of the following categories are selected for the survey.

A. *Wholesale Shops*

1. Foodgrains and Provisions
2. Textiles
3. Metal and Metal Products

B. *Retail Shops*

1. Foodgrains and Provisions
2. Textiles
3. Stationery and Toilets

TABLE 25

Average Monthly Wage Rates of Shop Assistants in the Trade & Commerce Sector

(Rs. per Month)

Year	*Wholesale Shops*			*Retail Shops*		
	I	*II*	*III*	*I*	*II*	*III*
1963-64	72	94	87	67	86	72
1965-66	85	110	101	78	96	84
1970-71	136	162	143	123	146	138
1975-76	274	310	255	222	260	270
1980-81	329	416	325	306	393	343

Wholsesale Shops

I. Foodgrain Shops
II. Textile Shops
III. Metal & Metal Products Shops

Retail Shops

I. Foodgrain Shops
II. Textile Shops
III. Stationery Shops

TABLE 26

Average Monthly Wage Rates of Shop Attenders in the Trade & Commerce Sector

(*Rs.*)

Year	*Wholesale Shops*			*Retail Shops*		
	I	*II*	*III*	*I*	*II*	*III*
1963–64	63	70	62	49	61	52
1965-66	75	87	74	64	75	65
1970-71	107	123	113	93	113	103
1975-76	201	241	189	176	203	192
1980-81	263	314	242	242	281	258

Standard of Living

A Planned Public Investment Programme aims at increasing the income of the individuals. This in turn steps up the demand for various items of consumption, and in the absence of any provision for absorbing at least partially the rising demand, prices are pushed up perforce imposing severe strain on the economy. Thus changes in consumer behaviour is an important indicator of the growth process and for planning the needed changes on the supply side. It has been observed from various studies on the subject that consumer items like cereals, milk and milk products, meat, fish and eggs, clothing, fuel and light occupy a significant place in the average family budget. About 30% of the aggregate household consumption expenditure is accounted for by the consumption of cereals which is considered as the most essential commodity. Nearly 99% of the cereal consumption in Kerala State is rice. The household consumption on any item is closely related to the total disposable income of the household and the household composition. Data on consumer expenditure of various Socio-economic groups are being collected by the National Sample Survey (N. S. S.) on a nation-wide basis in the form of "rounds" of survey year by year since 1950. The data are collected from selected households by the interview method. The consumption expenditure particulars collected by this enquiry comprised all expenditure incurred by the household during the reference period i. e., 30 days preceding the date of Survey and exclusively towards consumption for non-productive domestic purposes.* An examination of the monthly percapita consumer expenditure class

* The aggregate value of consumption per household may be used as an approximate indicator of the level of living. For any given round of the N.S.S. it is possible to arrange the sample households in ascending order of the aggregate value of the total per capita consumption expenditure per month. Such ordering would correspond approximated to increased levels of living. The sample household can then be divided into a suitable number of groups of equal to size in containing an equal number of persons in the estimated population called fractile groups, from the bottom. If say ten equal groups of each ten per cent (i.e., ten decile groups) are used, then the bottom ten per cent would represent the poorest section of the people and the top ten per cent of the richest households. A comparison of the consumption in physical terms or in money terms of particular items or of all items of goods or services, for the different decile groups supply information about disparities in levels of living between the decile groups.

relating to the rural and urban sectors of Kerala State for the years 1958-59 is presented below (14th round) 1964-65 (19th round) and 1969-70 (24th round). During 1969-70, the total monthly consumer expenditure per person was estimated at 31.06 for rural and Rs. 36.15 for urban. The corresponding figures for the year 1958-59 and 1964-65 vide Rs. 15.50 and Rs. 20.54 for the rural households and Rs. 20.46 and Rs. 26.02 for the urban households respectively. In 1969-70, about 72% of the total expenditure was expended on food items and 28% on non-food items.

Percentage distribution of consumer expenditure relating to the selected items under study, to total expenditure is furnished below:

TABLE 27

Percentage distribution of Consumer Expenditure

Items	Percentage of consumer expenditure on the item to total consumer expenditure					
	14th round (1958-59)		19th round (1964-65)		24th round (1969-70)	
	Rural	Urban	Rural	Urban	Rural	Urban
Cereals	37.87	31.52	28.54	27.13	31.04	26.33
Milk and Milk Products	2.64	4.54	3.70	5.04	3.96	5.15
Meat, fish and eggs	4.25	5.27	4.34	4.19	5.47	5.75
Clothing	6.12	3.51	5.92	5.56	2.80	4.18
Fuel and Light	6.83	6.50	6.26	3.67	5.99	6.16

The consumption pattern reveals that as income rises demand increases relatively sharp for milk and milk products and meat, fish and eggs than for cereals. The demand for cereals does not increase proportionately with the increase in purchasing power.

The consumption pattern of persons of different expenditure class (1983) also confirms the earlier observations.

Consumption

The distribution of households and persons according to per-capita monthly expenditure classes is given in the table below. It is seen that 5.42 per cent of the households are living at a per-capita expenditure level below Rs. 60 per month or in other words below two rupees per day in 1983. A substantial fraction (55.86 per cent) of the households enjoy a per-capita expenditure varying between Rs. 60 per month and Rs. 150 per month. Only 10.38 per cent of the households have per-capita expenditure above Rs. 300 per month.

TABLE 28

Distribution of Sample Households and Persons according to Per-capita monthly Expenditure–1983

Monthly per-capita expenditure	*Number of households*	*Percentage distribution of households*	*Number of persons per households*
(1)	(2)	(3)	(4)
0—30	11	0.24	5.82
30—40	28	0.62	6.70
40—50	76	1.69	7.43
50—60	129	2.86	6.52
60—70	225	5.00	6.45
70—85	463	10.29	6.09
85—100	493	10.95	5.97
100—125	738	16.40	5.40
125—150	595	13.22	5.50
150—200	688	15.29	4.83
200—250	390	8.67	4.57
250—300	197	4.38	4.20
300 and above	467	10.38	3.73
All classes	4500	100.00	5.29

Source: Statistics for Planning 1986, Directorate of Economics and Statistics.

The pattern of consumption shows that as the level of per-capita income of the households rises, the proportion of expenditure on food items steadily declines. The relevant details are given in Table-29.

TABLE 29

Consumption pattern of persons of different expenditure classes—1983 and average per-capita Expenditure

Per-capita Monthly expenditure class	*Per-capita expenditure*	*Average percentage expenditure on*	
		Food Items	*Non-food Items*
(1)	(2)	(3)	(4)
0—30	25.68	71.2	28.8
30—40	35.77	73.5	25.6
40—50	45.74	68.0	32.0
50—60	55.79	76.3	23.7
60—70	65.23	72.8	27.2
70—85	77.65	72.2	27.8
85—100	92.37	71.6	28.4
100—125	111.72	70.6	29.4
125—150	137.51	67.7	32.3
150—200	172.01	64.8	35.2
200—250	221.61	61.4	38.6
250—300	274.37	59.7	40.3
300 and above	530.88	42.4	57.6
All Classes	154.77	60.8	39.2

Source: Statistics for Planning—1986, Directorate of Economics and Statistics.

In Kerala, 60.8 per cent of the consumption expenditure of an average household is on food items. In the lowest per-capita expenditure group of Rs. 0.30, as much as 71.2 per cent of the expenditure is on food. The corresponding average per-capita monthly expenditure is as low as Rs. 25.68. Households in the highest expenditure class viz., Rs. 300 and above spent as much as 57.6 per cent of their total expenditure on non-food items. The adjoining table, throws light on the consumption pattern of persons of different expenditure class (Rural-Urban Combined).

TABLE

CONSUMPTION PATTERN OF PERSONS OF DIFFERENT

Item	Monthly Expenditure Classes (In Rupees)					
	0-30	30-40	40-50	50-60	60-70	70-85
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total: Cereals	11.08	13.51	17.09	21.82	23.13	26.68
Gram	..	0.09	0.09	0.10	0.15	0.09
Cereal Substitute	0.31	0.70	1.12	0.93	1.31	1.54
Pulses	0.17	0.25	0.47	0.66	0.83	0.97
Milk and Milk Products	0.20	0.55	0.69	1.19	1.33	1.75
Edible Oils	0.51	0.95	1.35	1.78	2.00	2.49
Meat, Egg, Fish	0.92	2.27	3.04	3.77	4.12	4.81
Vegetables	0.70	0.74	1.24	1.39	1.73	2.17
Fruits & Nuts	1.05	1.15	2.10	2.76	3.50	4.35
Sugar	1.12	1.22	1.32	1.53	1.67	1.95
Salt	0.09	0.09	0.10	0.12	0.12	0.12
Spices	0.93	1.32	1.51	0.50	2.15	2.39
Beverages and Refreshments	1.21	3.13	4.03	4.51	5.44	6.75
Total-Food	18.29	26.28	34.12	42.55	47.48	56.05
Pan, Tobacco Intoxicants	1.45	1.39	1.48	2.08	2.45	2.91
Fuel & Light	3.94	4.17	4.47	4.80	5.72	6.33
Clothing	..	0.23	0.29	0.33	0.96	1.57
Foot-wear	..	..	0.02	0.11	0.15	0.21
Misc. goods and Services	1.99	3.71	5.17	5.90	8.22	10.43
Durable Goods	..	..	0.18	0.02	0.25	0.16
Non-Food—Total:	7.38	9.49	11.62	13.24	17.75	21.60
Total Expenditure	25.68	35.77	45.74	55.79	65.23	77.65
Consumer Rent	..	..	0.11	..	0.05	0.07
Consumer Tax, Cess	..	..	..	..	..	0.01
No. of sample households	11	28	76	129	225	463

Source: Statistics for Planning-1986.

30

EXPENDITURE CLASS—1983 (RURAL-URBAN COMBINED)

(Value Rs. '000)

85-100	100-125	125-150	150-200	200-250	250-300	300 *and above*	*All Classes*
(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
29.64	33.15	37.12	40.25	45.04	48.12	54.60	34.86
0.18	0.19	0.28	0.29	0.51	0.50	0.89	0.28
1.74	2.14	2.24	2.61	1.99	1.73	1.48	1.87
1.36	1.89	2.30	3.01	4.55	5.03	8.29	2.55
2.66	4.28	6.03	8.56	13.33	16.69	26.17	6.92
2.88	3.40	4.33	4.93	6.34	7.41	11.29	4.29
6.31	7.54	9.25	11.72	14.24	16.69	27.75	9.79
2.66	3.48	3.88	5.24	7.21	7.67	13.24	4.40
4.98	6.77	8.37	10.58	13.22	16.59	24.45	8.63
2.20	2.61	3.07	3.52	4.41	4.68	7.20	3.08
0.13	0.13	0.13	0.14	0.15	0.16	0.21	0.13
2.81	3.27	3.76	4.17	4.95	5.15	6.76	3.57
8.64	10.03	12.33	16.50	20.03	30.31	42.63	13.80
66.18	78.87	93.10	111.50	135.97	163.72	224.96	94.17
3.31	3.91	4.61	5.39	6.33	7.51	8.42	4.42
7.16	7.91	8.97	10.27	11.94	13.02	18.59	9.00
1.98	3.57	6.48	9.90	18.07	23.52	71.92	10.84
0.35	0.59	0.92	1.32	1.82	2.52	6.38	1.18
13.12	16.28	22.25	30.75	41.88	56.40	113.44	27.20
0.28	0.58	1.18	2.88	5.61	7.69	87.18	7.96
26.19	32.85	44.41	60.50	85.64	110.65	305.92	60.60
92.37	111.72	137.51	172.01	221.61	274.37	530.88	154.77
0.20	0.17	0.31	0.82	1.88	3.77	9.08	1.15
0.01	0.03	0.02	0.07	0.09	0.18	0.73	0.09
493	738	595	688	390	197	467	4500

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VIII (b) Miscellaneous Occupations

It would be interesting to reproduce here the relevant portions from the chapter on the occupational structure as depicted in the Cambridge Economic History of India.

"Throughout the twentieth century, less than 60 per cent of Kerala's working population was engaged in agriculture, while more than 6 per cent worked in livestock, forestry, fishing, and plantations, and 12-15 per cent were in manufacturing. These features differentiate Kerala from the rest of India, and as the 1911 Census Superintendent for Cochin noted:

This comparative preponderance of industrial population in these two States (Travancore and Cochin) is due not to the infertility of the soil or its unsuitability to agriculture but to certain natural advantages possessed by them which have directed a larger proportion of people than in most other parts of India from agriculture to industrial occupations. Among these may be mentioned the existence of a large extent of backwaters and canals teeming with fish life and providing occupation to a large number of fishermen, fish-curers and dealers, and boat and bargemen; of valuable forests covering nearly one-half of the States and providing employment to numbers of wood-cutters, sawyers, carpenters and collectors of forest produce; and of the facilities for the cultivation of coconut palm, the raw produce of which affords scope for important and extensive industries, such as toddy drawing, jaggery making, arrack distilling, oil pressing, coir making etc..... ."

Kerala, while relatively poor in artisans, was rich in professionals, particularly doctors; it is not clear whether they combined their trade with other work. In a small hamlet in Cochin in 1916 there were several medical 'specialists' including an eye doctor and a children's specialist; their families had lived in the village for generations, and the villagers preferred them to the government doctor.[1]

During the half-century that followed, there was a further shift away from agriculture towards manufacturing and services. Employment of persons in plantations increased from about 22,000 to about 170,000 between 1911 and 1951, while employment of persons in manufacturing more than doubled,

[1] Gilbert Slater (ed.), some South Indian Villages (Madras, 1916) pp. 138-9.

from 466,000 to 877,000. Within services the bulk of the increase was in transport, storage and communications and other services. Curiously enough, employment in trade and commerce declined relatively.

Within manufacturing the bulk of the increase came in sugar production, cashew-nut processing, cotton textiles (mill and non-mill) coir and coir products, made-up textiles, wood and wooden products and non-metallic mineral products. These were generally traditional items made with locally available and abundant raw materials. Coir and Cashew were in addition, major exportables. Over half the persons engaged in manufacturing were women and they were mainly working in the coir and cashew industries.

The development of tea, rubber, coffee, spices, coir and cashew owed much to the existing system of inland water ways and sea-ports which even in the past had fostered trade and commerce. The trade figures for Cochin and British Malabar indicate that the aggregate value of trade rose from Rs. 150,000 in 1870 to about Rs. 1,050,000 in the 1920s. The major exports of Kerala in the 1920s included coffee, coir, lemon-grass oil, coconut oil, rubber, spices, tea and rope. In the 1930s there was a substantial expansion of exports, as a new commodity, cashew kernels from Travancore, entered the world market. Cashew exports alone were worth in 1930 about Rs. 75,000. The effects of expanding foreign trade on the domestic economy of Kerala must have been considerable.

Expanding exports must have meant an increased demand for services. This is reflected in the expansion of employment in transport, storage and communication and other services. In trade and commerce, the enormous growth in turnover did not result in a rapid growth in the numbers employed. It is worth noticing that in Kerala in 1911 for every person working in educational scientific, medical, and health services there was about half a person in public services (i. e., general administration); for the Indian Union in the same year, the corresponding proportion was 1:4. As a result there was a more rapid increase in literacy and a sharper decline in mortality in Kerala than in India as a whole. The proportion of literates to the population aged over 5 rose in Kerala from 26.7 per cent in 1911 to 53.8 per

cent in 1951; in the Indian Union the corresponding percentage even in 1951 was less than 20 per cent. The death rate in Kerala in 1951 had come down to 16.1 per 1,000 while the Indian rate was 27.4 per 1,000.

In 1951 Kerala had a remarkably low degree of dependence of agriculture for a State with a still rather low per head income. The growth of labour-intensive processing industries partly in response to foreign demand, probably had more dramatic effects on the employment pattern and other correlates of welfare like literacy and mortality than on per capita income.*

TABLE 31

The Distribution of the Male Working Force in Kerala 1911-1951

	Category	1911	1951
1.	Cultivators	31.5	25.6
2.	Agricultural Labourers	24.8	25.3
3.	Plantations, Forestry, Fishing, Livestock & hunting	12.0	6.5
4.	Mining & Quarrying	0.1	0.5
5.	Manufacturing	11.7	15.8
6.	Construction	2.2	1.9
7.	Trade and Commerce	8.7	8.4
8.	Transport, Storage and Communication	2.8	4.2
9.	Other Services	11.2	12.0
10.	Total	100	100

Source: Census of India 1961 Paper I: 1967.

* pp. 541-44—Cambridge Economic History of India, Vol. II, 1982.

At the time of the 1981 Census, the literacy rate had gone upto 70%, while the national average was only 35%. Similarly, the death rate in 1981 was 6.9 per 1000 while the Indian rate was 12.8 per 1000.

The position in the subsequent Censuses is also given below for purposes of comparison.

TABLE 32

The Distribution of the Male Working Force

	Category	1971	1981
1.	Cultivation	21.81	15.67
2.	Agricultural Labourers	25.10	23.32
3.	Plantation, Forestry, Fishing, Livestock, Hunting		
4.	Mining & Quarrying		
5.	Manufacturing		
6.	Construction	49.99	58.59
7.	Trade and Commerce		
8.	Transport, Storage and Communication		
9.	Other Services		
10.	Household Industry Workers	3.10	2.42
	Total	100	100

The changes in the concepts used in the Census partially explains for the reduction of the cultivators. The other factors responsible for the variation is the changing economic circumstances. The fragmentation of agricultural land and the impact of land reforms with their accent on the abolition of tenancy rights, has led to a reduction in the number of cultivators. The Censuses of 1971 and 1981, indicate that the high rate of literacy has earned for them better representation in clerical and administrative services than in other States in India. In industry women mostly uneducated are employed in large numbers because the main sources of employment viz., coir and cashew are labour intensive and they

are particularly adept in some of the processes. Categories like construction, trade and commerce transport and communication, mining and quarrying are still male strong holds. There is more under employment in rural areas as rural occupations mainly agricultural operations are mostly seasonal. Rural vocations absorb a comparatively higher proportion of female workers than urban occupations. Workers in the primary pursuits chiefly agriculture and allied activities are concentrated in the rural areas of the State. While household industry is typically rural, manufacturing is a predominantly urban; construction, trade and commerce, transport storage and communication and other services have large number of workers in the urban areas.

Government Servants

With the expansion of British rule in India, Government Employees began to acquire a professional character not only because the jobs became increasingly specialized but also the tenure of office and service conditions were such as to make them by and large impersonal in the performance of their public duties. Recruitment to the Public Service was determined by fixed rules, and contractual in nature. Entry into service, was conditional on the candidate's ability to pass a prescribed test or examination. Public Service became a learned and recognized profession. The first cause of increase in the number of Government Servants was the centralization of public functions. Once the principle of State action as the best means to secure relief particularly in situations of drought, famine and floods, was recognized, it was a matter of course to extend its operation to other economic fields such as industry and commerce. This extension in the scope of State's activity naturally signified a corresponding expansion in the bulk of the Public Service a tendency that was reinforced by consideration of specialized service. The object of specialization was to simplify administration so as to secure efficiency and to facilitate control. Basically arising from a large Scale Productive System, Specialization signified functional stratification, a hierarchy of specialists and experts.

Public Servants

The total number of officials on the pay roll of the Government of Kerala stood at 425,536 (as on 1-4-1986) of

these 135, were All India Service Officers. The table shows the number of Government officials on different scales of pay.

TABLE 33

	Scale of Pay	No.
1.	All India Service Officers	135
2.	3700-4200	20
3.	2600-3800	78
4.	2450-3600	41
5.	2250-3350	166
6.	2100-3040	401
7.	1950-2950	1,069
8.	1600-2710	469
9.	1500-2685	1,629
10.	1300-2650	792
11.	1250-2500	2,475
12.	1150-2270	8,349
13.	1100-2100	3,970
14.	1050-2000	14,499
15.	975-1720	3,464
16.	950-1640	20,456
17.	850-1600	10,592
18.	825-1430	34,761
19.	780-1320	78,968
20.	740-1245	17,351
21.	700-1140	10,379
22.	675-1340	2,888
23.	675-1125	2,100
24.	660-1050	60,868
25.	640-1000	62,548
26.	600-950	9,212
27.	575-900	24,311
28.	550-800	32,789
29.	Fixed Pay	261
30.	Others	1,394
	Total	425,536

Thus the State Government provides the largest number of job opportunities in the public sector particularly to the educated.

A profile on Kerala State Government employees conducted as a part of the Manpower Study Series of the Department of Economic & Statistics in 1980 throws light on the pattern of Government employment. Data received from 76 Government departments regarding their employees, were analysed in respect of sex, religion, age, qualification, training programmes attended etc. Sexwise distribution of employees revealed that females formed about 29% of the total employees. This may be due to the predominance of males in major departments like Agriculture, Animal Husbandry, Police, Public Works, Land Revenue, Subordinate Judiciary, Survey and Land Records etc. Religion-wise Hindus constituted about 71% followed by Christians with 19% and remaining 10% by Muslims. However, the percentage of female employees among Christians was higher—36%, than that of Hindus—29% and Muslims—17%. Regarding educational attainments, while more than 74% of the employees possessed qualification of S. S. L. C. and above, nearly 30% of the employees possessed either a diploma or Certificate in addition to their qualifications. Graduates formed about 16% of the total employees and post-graduates about 2.6%. A large number of employees in the Departments such as Collegiate Education, Technical Education, Medical Education and Health Services possessed Post-graduates and higher qualifications.

In view of the increasing consumption, expenditure, employees find it difficult to make both ends meet with a single, wage earlier in the household. Many are forced to rely on financial assistance of their spouses. This has resulted in a steady increase in the number of couples in employment either in government or other occupational avenues. The profile analysed that 34% of the Government employees in the above group.

The Government has implemented various measures to uplift the socially and economically weaker sections of society. Special quota in employment opportunities have been fixed to ameliorate person belonging to Scheduled caste|Scheduled Tribes and other backward communities. Apart from reservation of a certain percentage of posts, relaxation of age and qualification have also been made in the case of direct recruitment. About 9.5% of the total employees belong to Scheduled Caste|Scheduled Tribe Community and about 45% to Other Backward Classes.

The Learned Professions

In his well known work "The Indian Middle Classes—Their Growth in Modern Times"*—Dr. B. B. Misra observed thus.

"An increasing degree of specialization and a gradual narrowing down of specialized fields has been one of the notable features of professional growth in modern times. Professionalism in fact arose from the advancement of applied skill and knowledge. It necessitated the introduction of a regular system of examination and code of conduct to develop professional efficiency and integrity. While the advancement of specialized skill and education raised the status of those who possessed them without caste considerations, the strength of professional organizations made them free and independent. A common characteristic of all modern professional development has been that money replaced land as the form of payment for the service rendered. Besides, the nature of relationship between the parties concerned became increasingly free and contractual, the enforcement of a contract depending upon the degree of a court rather than the practice of local custom. In the West these features were the result essentially or economic revolution; in India they proceeded primarily from the operation of British courts. It took time for law to dominate custom. The process is still going on". The increase in the number of lawyers, Public Servants, Doctors and Teachers, Journalists and members of the other recognized professions was due to Educational, Judicial and Administrative development rather than to technological or industrial progress. From the peculiar circumstances of their growth the professional classes continued to comprise those who also ranked high in the hierarchy of caste. These groups became the spear-head of the middle classes. Though composed of different castes, they developed a common interest and outlook, a common language and behaviour pattern, and these features contributed to the growth of nationalism. The professional classes were the first to break through caste or regional barriers and to develop a sense of unity and solidarity which made possible the development of nationhood.

The information on some of the learned professions like Teachers, Doctors, Lawyers and Engineers is briefly summarised here.

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*The Indian Middle Classes—Their growth in Modern Times—Dr. B. B. Misra p. 162.

The Teaching Profession

The Government's salary bill according to the budget estimates for 1984-85 amounted to Rs. 474.82 crores constituting 44.63 per cent of the revenues. A break down of the outlay on salaries indicates that the salary of teachers and supporting staff formed 56% while the cost of the staff employed in general administration including Secretariat, Ministers etc., and the administration of justice, jails and police represent 12% of the total. The balance of 32% is incurred on staff for other services like Medical and Public Health, Agriculture, Animal Husbandry, Irrigation, Public Works etc. The following table analyses salary expenditure as a proportion of total expenditure (1984-85 Budget Estimate).

TABLE 34

Item	*Total expenditure (Rs. in crores)*	*Salary*
(1)	(2)	(3)
All Items	1,019.97	474.82 (46.6%)
Education	314.08	265.58 (84.5%)
Others	705.89	209.24 (29.6%)

Thus nearly 85% of the expenditure on education is on salaries of staff. In 1984-85 there were 12,102 schools under the department of which 4,464 are Government Schools and 7,638 private aided schools. The total number of school teachers is about 1.85 lakhs. The number of Arts and Science Colleges in the State during the same year was 168 colleges variously affiliated to the 3 Universities in Kerala viz., Kozhikode, Gandhiji and Kerala. The total number of college teachers was 12,884. The technical education infrastructure in the State consists of 6 Engineering Colleges, 27 Polytechnics and 55

Technical High Schools. The number of teachers in these institutions numbered 883, 1,171 and 1,022 respectively. The Education sector accounted for nearly 35% of the Employment in Government.

The innovation lately introduced into the structure of higher education in the country—viz., the private registration of candidates for appearance at University, examination, has led to an unprecedented growth of higher educational institutions outside the conventional framework. The existing facilities in regular institutions at the higher secondary and University levels are inadequate to scope with the burgeoning demand for education and thereby giving rise to new forms and types at the higher levels. Euphemistically called parallel colleges, they are found functioning in every nook and corner of the State providing employment based on modest reckoning to nearly 1.25 lakh persons of whom 1.1 lakh are teachers and the rest other employees like clerks, peons, sweepers and laboratory attenders. The salaries and working conditions of the personnel in the parallel formation are far from satisfactory perhaps the most exploited group in the educational system.

The Medical Profession

Kerala possesses a good health care system and the accent, is now on the preventive, curative, promotional and rehabilitative aspects. Over the past years of development effort, the State has established a sound curative health service infrastructure and facilities which helped in lowering the infant mortality rate, death rate, birth rate and maternal mortality rates to levels far below the all India averages. The attainment of the above indicators of enviable standards has been facilitated to a considerable extent by the high female literacy, inculcation of clean health habits in terms of individual, family and environmental hygiene. Undoubtedly the State is in the forefront in regard to accessibility of services. The number of medical institutions (allopathic) under Government was

1,015 in 1985-86 with a bed strength of 35,744. The medical and para medical personnel in these institutions consisted of 18,910, whose category-wise break up is given below.

TABLE 35

Medical and Para Medical Personnel in the Health Services Department (other than Medical Education)

Sl. No.	*Category*	1985-86 *Nos.*
1.	Medical Officers	3514
2.	Dentists	71
3.	Senior Nurses	932
4.	Junior Nurses	4589
5.	Pharmacists	600
6.	Lady Health Inspectors	1626
7.	Junior Public Health Nurses	3919
8.	Junior Health Inspector	2583
9.	Health Inspector	1076
	Total	18910

Source:—Director of Health Services

In addition to these, 1,520, were serving in the Medical Education Department in the teaching faculty. The number of registered medical practitioners in all the systems of medicine was 33,314 in 1985-86 and the para medical staff numbered 33,144. As a result of the tremendous expansion in infrastructure and services the State had to bear a heavy financial burden for the maintenance of the created facilities. The expenditure on health stood at Rs. 102.72 crores and the per capita expenditure on health was Rs. 54.

The details of registered medical practitioners in all the systems of Medicine and the para medical staff is given below:

TABLE 36

	System	1985-86 (Nos.)
1.	Modern Medicine	15470
2.	Homoeopathy	4636
3.	Ayurveda	11834
4.	Siddha	1317
5.	Unani	57
	Total	33314

Source:—Registrar of Medical Councils.

Para Medical Personnel

1.	Nurses	10430
2.	Midwives	10137
3.	Nurses and Midwives (Integrated)	6334
4.	Auxiliary Nurse-Midwives	5935
5.	Health Visitors	308
	Total	33144

Source:—Directorate of Health Services.

The availability of registered medical practitioners (of all systems) per thousand population is 1.22 in Kerala

The Legal Profession

Turning next to the Legal Profession as it is today it could be observed that it is the most significant of the new professions which emerged from the Western Constitution of Courts and Legislative enactment in Modern India. It has evolved from

the traditional lawyer called *Vakil,* which originally was a "generic term employed in the sense of an agent or ambassador who represented his principal for varied purposes" and later metamorphosed into a class of legal practitioners who represented a party in court and became increasingly conformable to a pattern.

In India, the law relating to the legal profession is governed by the Advocates Act, 1961, and the rules framed thereunder by the Bar Council of India. It is a self contained code of law relating to legal practitioners and provides for the constitution of State Bar Councils and the Bar Council of India. Persons enrolled as advocates under the Advocates Act with one of the State Bar Councils are entitled to practice the profession of law throughout the country. An advocate on the roll of any State Bar Council may apply for transfer to the role of any other State Bar Council in the prescribed manner. No person shall be enrolled as an advocate on the roll of more than one State Bar Council. There are two classes of advocates—"senior Advocates" and "other advocates". An advocate may, with his/her consent, be designated as senior advocate, if the Supreme Court or a High Court is of the opinion that by virtue of his/her ability, standing at the Bar or special knowledge or experience in law he/she deserves such distinction.

Senior advocates shall, in the matter of their practice, be subject to such restrictions as the Bar Council of India may, in the interests of the legal profession, prescribe. Some of the restrictions on a senior advocate in the matter of his practice, are, that he shall not file a *vakalatnama;* he shall not appear without an advocate on record; he shall not accept directly from a client any brief, or instruction to appear in a court, etc.

Certain standards of education, etc., have been prescribed for enrolment, as advocates. There are certain rules, regulating the standards of professional conduct and etiquette, right of pre-audience, seniority, disqualification for enrolment, etc.

Every advocate shall bear in mind that any one genuinely in need of a lawyer is entitled to legal aid even though he cannot pay for it fully or adequately, and within the limits of an advocate's economic condition, free legal assistance to the indigent and oppressed is one of the higher obligations an advocate owes to society.

The Bar Councils have disciplinary jurisdiction over advocates on their rolls. This is, subject to a right of appeal to the Bar Council of India and a further right of appeal to the Supreme Court of India.

The 1981 Census Report General Economic Tables Part III-A & B (ii) enumerated in the occupational group 14—Jurists 10,036 persons consisting of 9,521 males and 515 females in Kerala. The group comprised of 5,734 lawyers, 305 judges and magistrates, 112 law assistants and 3,785 petition writers.

The Engineering Profession

Engineers play a key-role in the economic development of the State. The technical institutions like the Engineering Colleges, the Polytechnics, I. T. I's, the Kerala State Electricity Board, the Kerala State Water Authority, the Public Works Department of the State Government, the K. S. R. T. C. the Vikram Sarabhai Space Centre, the Keltron, the Kerala State Construction Corporation, alongside the public sector concerns of both the Central and State Governments are principal sources of employment to engineers. The Institution of Engineers India has a centre at Trivandrum, whose aim is to foster the welfare of the profession. There are also professional bodies like the branches of the Institute of Industrial Engineers, Chemical Engineers, Electronic Telecommunication Engineers whose aim is to promote better understanding of engineering techniques, provide facilities for interaction of ideas, foster education and research in the various branches of engineering. They also seek to help in maintaining a high professional standard besides formulating and sustaining a code of ethics among the members of their respective professions.

The occupational classification in the 1981 Census listed 13,240 persons in Kerala as actively engaged in the engineering profession in various capacities ranging from Architects, town planners, civil engineers, electrical and electronic engineers, mechanical engineers, chemical engineers, industrial engineers, surveyors, technologists etc. In addition 19425 were categorised as engineering technicians comprising of draughtsmen, engineering, overseers and technicians, women formed a negligible group about 7%.

Journalists

The emergence of a new class of writers, publishers and printers owed its origin to the establishment of the Indian

Press. A few of the developments that influenced society generally were the initiative of the European Christian Missionaries in establishing presses and producing literature in Malayalam, though in the beginning for the exclusive purpose of spreading the gospel. Secondly the language press became the most effective means of influencing public opinion and government policy. It checked the arbitrary conduct of a despotic administration.

The 1981 Census is an important source conveying information on the number of Journalists along whom Authors Poets and related workers were clubbed. This group consisted of 1,686 persons at the time of the Census count. The working Journalists have a Union with branches in leading towns to promote the interest and well being of its members. Working Journalists include News Editors, Assistant Editors, and Leader writers, Chief Editors, Sub Editors, Reporters and correspondents. There are also part time employees serving more than one newspaper.

Domestic and Personal Services

The number of people engaged in domestic service is considerable. Here women outnumber men. The 1981 Census estimated those occupied in House keeping services as Maids and other unclassified workers at 99,133, of whom 73,226 were women. More than 40,000 were employed in urban areas. Most of the employees in this group are either paid a fixed monthly wage or are paid according to the means of the employer. The wage rate in this sector is relatively lower than other callings in view of the unskilled nature of the service. In certain instances the domestic servants also receive meals and shelter in addition to their emoluments. The growth of the middle class has given rise to an increasing demand for domestic service workers. Besides the above group, 1981 Census recorded the number of cooks, waiters, bartenders and related workers both domestic and Institutional at 77,363 of whom women workers constituted 13% only.

Barbers

The profession of Hair dressing in the State was a traditional callings pursued by a hereditary caste called by different names such as Vilakkithalavans, Vattis, Ambattans etc. Custom required the obligatory participation of a member of this sect in rituals particularly those relating to observance of birth

and death ceremonies. The practice of having family barbers was also in vogue. However this custom is fast fading into oblivion. A large number of hair dressing establishments, have sprung up throughout the State. In the larger towns and cities, paid employees are employed in the Saloon. To better their wages, the hairdressers have organised themselves into Trade Unions. Minimum wages have been fixed for employers in hairdressing establishments. The 1981 Census classified the number of hair dressers, barbers and related workers at 27,502. A new phenomenon that could be witnessed in the larger cities and towns is the emergence of beauty clinics and parlours, where women who are interested could have a facial make up, hair-do and other forms of beauty treatment. These are run mostly by women. Their services are greatly in demand during the wedding seasons for dressing up the bride. The 1981 Census estimated that 280 persons were engaged as beauticians in the State.

Washermen

The Malayali bestows great care towards personal hygiene. Washing cloths is a daily chore meticulously performed by almost everyone. This renders the washermen called the Dhobi in popular parlance an indispensible member of the society. In the past the washerman used to collect cloths from the households in the village where he had a customary right and was remunerated annually or half yearly in kind usually paddy or new cloth dress material. This custom has disappeared and has been replaced by laundries and dry cleaning establishments particularly in Urban areas. In the laundries, workers are engaged by he proprietors for washing and ironing cloths on a wage basis.

The traditional Washermen also known as Mannan, Perumannan, Vannan or Veluthedan, was a hereditary calling. The washermen are assisted by the womenfolk and other numbers of their family in their pursuits, as could be observed from the 1981 Census classification of occupations which indicated that out of nearly 23,000 engaged as laundry workers, washermen and Dhobis 12,500 were women. Minimum wages have been fixed by Government for the employees of laundries.

Tailors

The improvement in standards of living has resulted in changes in sartorial habits. The rapid alteration in fashions and taste have rendered inevitable the services of tailors. The

availability of the sewing machine on easy and convenient instalments on the hire purchase system and also on bank credit has attracted many to this profession particularly men and women in the younger age group. While the single tailor unit is prevalent in the rural areas, in the urban areas fairly large tailoring establishments employing upto twenty workers could be seen. Tailoring is a skilled occupation and nearly 90,000 people were enumerated in the 1981 Census, as engaged in tailoring, dress making, sewing, upholstering and other related works. Women formed 25% of this group. The fixity of employment has been assumed for most of the employees besides weekly holiday and minimum wage.

The foregoing does not portray a complete picture of the occupational scene, but it is hoped to will convey a fairly interesting insight into the miscellaneous occupations in the State.

VIII (C) General level of Employment in different Occupations

The number of persons on the live register of Employment Exchanges gives an idea of the trend of unemployment subject to certain limitations. Employment Exchanges cover mainly urban areas. Registration with the Employment Exchanges being voluntary, not all the unemployed register their names in the Exchanges. Further some of the registrants are already employed but have registered for seeking better employment.

Employment Situation

The analysis of the employment exchange statistics throw some light on the educated unemployment problem in the State which has been worsening in the last few years. The number of job seekers as on 31-12-1985 was 25.74 lakhs. The number has further risen to 27.02 lakhs. This formed 10.5 per cent of the total job seekers in the country. The total work seekers in the country as on September, 1984 was 235.2 lakhs. Between December 1983 and 1984, 1.96 lakh persons (8.7 per cent increase) were newly registered with the employment exchanges in the State. It has to be reckoned that live register figures contain also employed persons who have registered for better jobs. Their exact number however is not known. Of the total work seekers 48.5 per cent were having qualifications below S.S.L.C. Among the candidates with qualifications S.S.L.C and above, 9.5 per cent were pre-degree passed, 6.7 per cent were graduates and 0.7 per cent were post graduates. The number of registered graduates

decreased from 0.89 lakhs in 1983 to 0.84 lakhs in 1984. But the number of post graduates increased from 7,040 in 1983 to 8,286 in 1984.

The adjoining table throws much information on the functioning of Employment Exchanges in the State during the period 1958 to 1985.

TABLE 37

Employment

Year	*Number of Employment Exchanges (No.)* *	*Applicants on the live register of Employment Exchange ('000 (Nos.)* *	*Employment in organised sector ('000 (Nos.)* +	*Employment in public sector ('000 Nos.)* +	*Employment in private sector ('000 ('000 Nos.)* +
1958	9	125	N.A.	N.A.	N.A.
1962	9	202	567	211	356
1972	11	376	754	337	417
1981	25	1,904	1,017	499	518
1982	28	1,896	1,040	520	520
1983	28	2,109	1,055	539	516
1984	.33	2,458	1,061	551	510
1985	33	2,574	1,072	563	509

*Figures as on December end.

+Figures as on March end.

Professional and Technical Work Seekers

The total number of professional and technical work seekers as on December, 1985 was 68,724 consisting of 1.143 Doctors, 2,913 Engineers, 11,257 Diploma holders in Engineering, 53,237 I.T.I. Certificate holders, 1.49 Agricultural Graduates and 25 Veterinary Graduates. The number of Veterinary Graduates who registered with the Employment Exchanges increased from 14 in 1983 to 42 in 1984 and Engineering Graduates from 1,757 to 2,312 (31.6 per cent).

TABLE 38

Number of Professional and Technical Work Seekers

Period Ending	*Medical Graduates*	*Engi-neering Graduates*	*Diploma Holders in Engi-neering*	*I.T.I. Certi-ficate Holders*	*Agri-cultural graduates*	*Veteri-nary Graduates*
31-12-1970	281	1,852	3,547	8,380	133	70
31-12-1975	809	1,850	3,990	20,113	32	117
31-12-1980	871	1,505	6,833	29,973	106	17
31-12-1984	1,035	2,312	11,645	48,45[illegible]	263	42
31-12-1985	143	2,913	11,257	53,237	149	25

Placement through Employment Exchanges

The number of placings effected through Employment Exchanges in Kerala is presented in Table 39. It is seen that the number of placings is decreasing in recent years. It has decreased to 11,361 in 1984 from 39,594 in 1980. The monthly average number of employers who use the services of Employment Exchanges in 1984 was reported to be 430 compared to 928 in 1981. In 1985, there were 13,700 placings through Employment Exchanges and on an average 400 employers used the services of Employment Exchanges every month during 1985. As per standing orders of Government even short duration vacancies occurring in Government Offices|Companies| Organisations have to be filled up by candidates advised for recruitment by the Public Service Commission and this may be the reason for a decrease in the number of placings through Employment Exchanges in recent years.

TABLE 39

Number of Placings through Employment Exchanges in Kerala

Year	*Number of placings*	*Monthly Average Number of Employers using Employment Exchanges*
1970	17,939	563
1975	23,678	546
1980	39,594	815
1984	11,361	430
1985	13,700	400

Employment in the Organised Sector

The employment in the organised sector in Kerala for the quarter ending December, 1984 was 10.79 lakhs as against 10.70 lakhs for the quarter ending December, 1983. The public and private sector employment figures were 5.68 lakhs and 5.07 lakhs respectively in December 1984 and 5.66 lakhs and 5.14 lakhs respectively in December 1984. On an examination of the relevant statistics from 1970 onwards (Table 40), it becomes clear that employment in public sector is increasing faster than that in the private sector. With March 1979 as base, the organised employment indices for December, 1985 in Public and Private Sectors are 119.5 and 99.7 respectively, thus giving the index of organised sector employment at 109.3. These figures also indicate a virtual stagnation in employment in the organised private sector in Kerala.

TABEL 40

Organised Employment in Public and Private Sector in Kerala

(Index: Base 31-3-1979=100)

Period Ending	Public Sector		Private Sector		Total	
	No.	Index	No.	Index	No.	Index
31-12-1970	293,318	61.6	409,562	80.5	702,880	71.4
31-12-1975	418,151	87.8	462,712	90.9	880,863	89.5
31-12-1980	496,659	104.3	525,459	103.4	1023,118	103.9
31-12-1984	565,587	118.8	513,503	100.9	1079,090	109.6
31-12-1985	568,713	119.5	507,395	99.7	1076,088	109.3

Unemployment Assistance and Self Employment Scheme

Under "Kerala Unemployment Assistance and Self Employment Scheme, 1982" an amount of Rs. 1,012.08 lakhs was disbursed to 1.79 lakh eligible beneficiaries out of 3.58 lakh applicants through employment exchanges during the financial year 1985-86. Under the Self Employment Scheme out of 1.78 lakh applicants upto 31-3-1986, 0.74 lakh have been assisted to start their own employment programmes. An amount of Rs. 445.38 lakhs was disbursed.

TABLE 41

Unemployment Assistance Scheme and Self Employment Scheme

Year	Unemployment Assistance Scheme			Self Employment Scheme		
	Applications received	No. of Beneficiaries	Amount disbursed	Applications received	No. of beneficiaries	Amount disbursed
			(Rs. in lakhs)			(Rs. in lakhs)
1982-83	161,211	44,011	80.22	86,026	954	5.72
1983-84	44,744	98,261*	649.79	14,987	26,419	158.51
1984-85	102,939	136,479*	768.52	54,966	17,711	106.26
1985-86	48,715	179,146*	1012.08	22,180	29,149	174.89
Total	357,609	179,146	2,510.61	178159	74,233	445.38

* This figure is the Cumulative number of beneficiaries including the beneficiaries of the previous years also.

Source:—Directorate of Employment, Trivandrum.

State Planning

The State of Kerala was formed on November 1, 1956 i. e., during the Second Plan period. The first two Five Year Plans (1951-1961) aimed at overcoming the perpetual problem of food shortage and consolidating the agriculture base of the economy. The emphasis on the First Plan (1951-56) was naturally placed on agriculture, and a little over a sixth of the total outlay of Rs. 3,003 lakhs was allocated for schemes under Agriculture, Community Development and Irrigation. A gross increase in the production of food grains to the tune of about 3.00 lakh tonnes was the main achievement under the first plan. A major attempt was also made in the direction of building up Irrigation and power projects. Against an outlay of Rs. 30 crores, the expenditure was Rs. 25.87 crores. The Second Plan (1956-61) was a bolder attempt at economic development. The outlay of the second plan for the re-organised State was Rs. 87.00 crores of which Rs. 80.22 crores were expended. Agriculture and industry cornered the major share of investment during the second plan. The main emphasis in the programme for agricultural development was on food production. By 1961, food production rose to 10.50 lakh tonnes as against 8.70 lakh tonnes in 1956.

The performance of the State's Third Plan (1961-66) was satisfactory from the point of view of overall order of expenditure in relation to the plan outlay. Unlike in the second plan. in which there was a shortfall of expenditure of about 10%, the expenditure during the Third Five Year Plan was Rs. 182.31 crores as against plan provision of Rs. 170 crores. In other words the financial targets were more than achieved. However the progress in the different sectors has not been uniform. While the actual provision fell short of the plan outlay in important sectors like agriculture, community development and co-operation and industry and mining, it was in excess of the plan outlay in the social services sector. The services sector continued to develop at a faster rate than the primary and secondary sectors.

The situation created by the Indo-Pakistan conflict in 1965, two successive years of severe drought, devaluation of the currency, general rise in prices and erosion of resources available for plan purposes delayed finalisation of the Fourth Five Year Plan. Instead between 1966 and 1969, three Annual Plans were formulated within the frame work of the Draft outline of

the Fourth Plan. They took into account the conditions prevailing at that time. The State of the economy and the non-availability of financial resources for plan purposes kept down the size of development outlay during this period.

The Fourth Five Year Plan (1969-74) aimed at accelerating the tempo of development in conditions of stability and at reducing fluctuations in agricultural production. It aimed at raising the standard of living of the people through programmes which at the same time were designed to promote equality and social justice. The plan laid particular emphasis on improving the condition of the less privileged and weaker sections of the society especially through the provision of employment and education.

The Fifth Five Year Plan (1974-79) had the following as its main objective (i) achieve an annual growth of the State's economy at the rate of 6% per annum so as to bridge the existing gap between the per capita income of the State and the per capita national income of the country, (ii) maximise food grains production through intensive cultivation and institutional changes, (iii) Speed up land reform measures, (iv) Achieve more rapid industrialisation of the State through establishment of new ventures and modernisation of the existing traditional industrial sector, (v) Improvement in the level of living of the poorer strata of society by making available to them an increasing share in the fruits of planned development, (vi) Reduce the wide disparity in development among the regions within the State and (vii) Maximise employment opportunities giving emphasis on employment intensive programmes in the various development sectors.

The Sixth Five Year Plan (1980-85) was formulated after taking into account the achievements and short comings of the past three decades of planning. Removal of poverty was the foremost objective of the plan even though it was recognized that the task of this magnitude could not be accomplished in a short period of five years. The strategy adopted for this plan consisted essentially in moving simultaneously towards strengthening the infrastructure for both agriculture and industry so as to create conditions for an accelerated growth in investments, output and exports and provide through special programmes designed for the purpose, increased opportunities for employment especially in the rural areas and the unorganised sector and meet the minimum basic needs of the people. Stress

was laid on dealing with inter-related problems, through a systematic approach rather than in separate compartments, on greater management efficiency and intensive monitoring in all sectors and active involvement of the people in formulating specific schemes of development at the local level and securing their speedy and effective implementation.

The progress of plan expenditure in Kerala from the First Plan to Sixth Plan is shown in the adjoining table.

Community Development .

Development of the rural areas has been one of the paramount concerns of the successive five year plans. Under the Community Development Programme launched on 2nd October 1952 a net-work of basic extension and development services was established in the villages. A multipurpose programme embracing almost all fields of development activity such as Agriculture and Animal Husbandry, Irrigation, Co-operation, Health and Rural sanitation, Education, Social Education, Communication, Rural Arts and Crafts, Industries, and Housing was implemented. The unit of development was the Block, normally comprising of a cluster of villages, with the Block Development Officer as its head. Each item of community development was in charge of a specialist called Extension Officer. The Block is divided into several circles each of which is under a Grama Sevak (now redesignated as General Extension Officer). The programme helped in creating awareness in the rural communities of the potential means of development which made quicker adoption of major technological advances in agriculture possible, later in the mid sixties. Reinforced with abolition of intermediary landlords and reforms of land tenure system, the investments in the successive five year plans have led to the creation of essential physical and institutional infrastructure of socio-economic development in many rural areas.

Later realising that the benefits of the various development programmes were being mostly absorbed by those better endowed in terms of land resources, specifically designed schemes oriented towards the development of small and marginal farmers and landless and agricultural labourers were taken up in the early 70's. Food for work programme was started in 1977 to provide opportunities of work for the rural poor particularly in slack employment periods of the year which would

TABLE 42

Plan-wise outlay and Expenditure in Kerala from I Plan to VI Plan

(Rs. in lakhs)

Sector	1st five year plan		2nd five year plan		3rd five year plan		Annual plans 1966-67 to 1968-69		4th five year plan	
	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Agriculture and allied services	562	245	1,458	1,272	4,049	3,477	3,664	3,798	5,458	4,981
Co-operation	8	4	121	64	246	206	106	92	155	638
Irrigation Flood control, Anti-sea erosion and power	1,763	1,571	3,394	3,274	5,919	7,635	5,955	5,442	10,953	14,329
Industry and minerals	112	50	684	604	1,719	1,437	1,014	1,334	2,208	2,502
Transport and communications	258	336	557	718	1,088	1,196	916	1,067	1,965	3,075
Social and community services	300	384	2,391	2,024	3,839	4,178	2,553	2,671	5,068	7,780
Economic services	..	..	96	66	148	102	46	33	33	30
General services	..	..	..	..	..	..	..	..	..	..
Total State Plan	3,003	2,590	8,701	8,022	17,000	18,231	14,254	14,437	25,840	33,335

Plan-wise outlay and Expenditure in Kerala from I Plan to VI Plan (Contd.)

(Rs. in lakhs)

Sector	5th five year plan		Five year plan 1978-83 1978-79 and 1979-80		6th five year plan		Total	
	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure	Outlay	Expenditure
(1)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Agriculture and allied services	10,745	7,584	6,909	6,467	33,888	30,979	66,733	58,803
Co-operation	739	544	570	511	2,200	2,920	4,145	4,979
Irrigation, Flood control, Anti-sea erosion and power	22,220	19,438	16,078	14,977	59,378	59,124	1,25,660	1,25,790
Industry and minerals	6,154	5,406	4,227	6,707	15,676	16,147	31,794	34,187
Transport and communications	4,103	3,788	2,634	3,297	10,675	10,766	22,196	24,243
Social and community services	12,159	11,023	8,160	10,300	30,679	35,381	65,149	73,741
Economic services	220	118	94	93	625	602	1,254	1,044
General services	556	661	624	518	1,920	2,301	3,100	3,480
Total State Plan	56,896	48,562	39,296	42,870	1,55,041	1,58,220	3,20,031	3,26,267

at the same time create durable community assets. This programme was redesigned as National Rural Employment Programme (NREP) in October 1980. With a view to removing regional disparities, particularly in less endowed or disadvantaged areas like the hill and tribal areas, special sub plans of development were introduced. A minimum needs programme was designed to secure to the rural areas within a reasonable time frame certain basic amenities in the fields of education, health, drinking water, electrification, roads and housesites. Special financial concessions, credit on softer terms and subsidies have also been made available to under developed areas to attract increased agro-industrial investment to remove regional imbalances. The National Scheme of Training of Rural Youth for Self Employment (TRYSEM) was initiated in 1979 with the principal objective of removing unemployment among rural youth. To provide more employment opportunities for the rural landless, a new and poverty programme called Rural Landless Employment Guarantee Programme (RLEGP) was launched on 15th August 1983.

Integrated Rural Development Programme

A programme the IRDP-Integrated Rural Development Programme was launched in 1978-79 with the objective of raising the poorest families in the rural areas above the poverty line by giving them income generating assets and access to credit and other inputs. This programme is now a component of the 20 Point Programme. The IRDP is aimed at a target group consisting of the poorest among the poor including small and marginal farmers, agricultural and non-agricultural labourers, rural artisans and craftsmen, scheduled tribes and in fact all persons who live below the poverty line (families of about 5 persons with an annual income below Rs. 6,400). The twin objectives of raising incomes and generating employment are to be achieved through investment in agricultural and ancillary occupations, cottage and small scale industries and in practically any viable economic activity which suits the beneficiary family. Under IRDP, the investments made in various activities are to be governed by the interest shown by the beneficiary in the activity and its acceptability to the banking institutions. The State Government is the authority to sanction schemes under IRDP. There is a State level co-ordination Committee to approve the block level plans, the Committee meets periodically to review the implementation of the programme and offer the necessary directions for accelerating the

programme. The implementation of the programme is being done through the district level rural development agency a society registered under the societies Registration Act, 1960. District Rural Development Agencies (DRDAS) have been set up in all the Districts and they are fully operational in 151 blocks spread over all the villages in the State. The Industries Services and Business (ISB) component has been incorporated in the programme with the objective of exploiting the employment opportunities in the secondary and tertiary sectors as the absorption capacity of the agricultural sector for self employment has reached a saturation point. 1.05 lakh families including 55,000 scheduled caste and scheduled tribe families were assisted during 1984-85. The average assistance per family was Rs. 3,642 with a subsidy component of Rs. 1,185.

National Rural Employment Programme (NREP)

Substantial reduction in poverty and unemployment|under employment has been one of the principal objectives of successive five year plans. The strategy adopted for achieving this objective has been to have determined efforts at redistribution of income and consumption in favour of the poorer sections of the population by significantly increasing employment opportunities. The National Rural Employment Programme (NREP) is the culmination of previous experiences in implementing employment schemes. The three fold objectives of the scheme are generating additional gainful employment opportunities, creation of durable community assets and raising of the nutritional standards of the poor.

Under NREP all types of works which result in creating durable community assets are allowed to be taken up. In the case of scheduled caste|tribe beneficiaries, works benefiting individuals are permitted. Shelf of projects are prepared on the basis of identified work projects reflecting the felt-needs of the rural community. Out of the shelf of projects, annual action plan for each year is drawn by the District, rural development agencies with due regard to the availability of funds. The programme is implemented through DRDA's. At least 50% of expenditure is on wage component. 10% of the applications are earmarked for utilisation in social forestry sector. Another 10% of the allocations are earmarked for works directly benefiting the scheduled castes|tribes workers engaged in this programme who are paid according to minimum wages.

Payment is made partly in cash and partly in kind. One kilogram of foodgrains at subsidised rate is given to the workers as part of wage. The programme has generated additional employment and created durable community assets. It has helped in ensuring payment of minimum wages to rural labourers and in improving their nutritional standards. The improvement in communications due to construction of roads has provided facilities for trade and commerce. The programme has generated 142 lakh mandays of employment (i.e., upto 1984-85). The highlights of the programme are construction of 1,570 houses, 105 schools, 7 community centres, 2 hospitals and 1,522 km. of rural roads.

Rural Landless Employment Guarantee Programme (RLEGP)

It has been felt for sometime that the hard core of rural poverty particularly pertaining to employment opportunities for the landless during the non-agricultural periods, when work is so scarce has to be tackled in a more direct and specific manner. Accordingly from 1983-84 onwards a new scheme—Rural Landless Employment Guarantee Programme (RLEGP) has been launched, with the two basic objectives of improving employment opportunities for rural landless with a view to providing guarantee of employment to at least one member of every landless labour house-hold upto 100 days a year and second to create durable assets for strengthening of the rural infrastructure which will lead to rapid growth of rural economy. The programme has generated 50 lakh mandays of employment and constructed 1,392 houses under the asset generation programme till the end of 1984-85.

Training of Rural Youth of Self Employment (TRYSEM)

The National Scheme of Training of Rural Youth for Self Employment was launched on 15th August 1979 with the main objective of training rural youth in the age group of 18-35 from the target group of families in the rural areas i. e., families having income less than Rs. 3,500 per annum in technical skills to enable them to take up self employment in different vocations. Only one rural youth per eligible family is to be selected for training. The vocations confine broadly to the field of agriculture and allied activities, industry, services and business activities etc.

The main components of the scheme are (i) to train 40 rural youth per block per year (ii) to pay monthly stipend, daily allowance where necessary and tool kit to the trainees and allowances for raw materials at specified rates (iii) to pay honorarium to trainers|master craftsmen etc. (iv) grant of subsidy to the trained youth at 33⅓% of the cost of the scheme to trained youth to set up self employment ventures subject to the maximum subsidy limits of Rs. 3,000 (Rs. 5,000 for scheduled tribe families), to arrange the balance of the cost of the scheme through institutional finance (to the extent of Rs. 6,000) and to strengthen the training infrastructure of institutions, voluntary organisations etc. In 1984-85, 9,754 persons were trained of which 4,436 (newly 46%) were placed for self employment.

Future Plans and Prospects

The prospects of the Kerala's future economic development are closely linked with the structure and content of the planning process hitherto adopted and the special features of the State's economy. Successive Governments in the State have laid emphasis on the spread of education and health services, social welfare measures and infrastructure such as roads, water supply and electricity. As a consequence of this pattern of investment, it is generally recognised that social consumption of the people at all levels of income in Kerala is the highest in the country. Yet the twin problems of poverty and acute unemployment continue. In regard to matters like food deficit and regional disparities also it has not been able to create any worth-while impact so far. These are the problems which should engage the attention of the State Government in the coming years.

The pattern of development followed by the erstwhile princely States and largely followed by the State during the plan era has contributed to several positive as well as negative aspects in the lives of the people of Kerala.

Kerala today has the highest literacy in the country viz., 70.42% as against an all-India rate of 36.03%. Female literacy is also the highest in Kerala. But for a few isolated pockets, Kerala has fulfilled the constitutional requirement of universal primary education for children up to the age of 14. The growth of medical facilities in the State has been quite high compared to other States and this is exemplified by the fact that there is atleast one dispensary in each Panchayat.

The number of beds per lakh of population at 124 in 1982-83 in Kerala is the highest in the country. The death rate in the State is 6.4 per 1,000 and this is virtually the lowest that can achieved. Infant mortality rate at 33 per thousand is also the lowest compared to other States. The life expectancy of a Keralite is 62 years compared to the all India average of 53 years. The birth rate has been steadily declining during the last few decades and is now about 23 per 1,000 as against 33 for all India. The growth of population was only 19% in the decade 1971-81 compared to 25% for India as a whole.

The settlement pattern in the State is quite different from that in other States. Homesteads in Kerala are spread throughout the State, and as a result, a wide net-work of roads has been developed. Other types of communication facilities are also fairly well developed in the State. By the end of the Sixth Plan period water supply would have been extended to all the "problem" villages in the State. Electricity has been taken to all the villages in the States.

The pattern of development followed by the State has certain negative aspects also. Owing to the lower emphasis given to productive sectors, the general rate of growth of the State's economy has been slow. The record of development of both the industrial and agricultural sectors has been unimpressive. As a single occupation, agriculture in Kerala does not generate sufficient income for an average family owing mainly to the extreme fragmentation of holdings and low productivity. Attempts at overcoming these drawbacks have not been successful. The State continues to be deficit in food and produces only 42% of the rice and 10% of the pulses it needs. This has resulted in an annual outflow of about Rs. 400 crores, to other food producing States in India. Again, as a result of this food deficiency there is a tendency for prices of food products to be higher in Kerala. The inflow of gulf remittances adds to the prices rise and owing, among other things, to the centralised saving system through commercial banks, Kerala has not been able to get much of these remittances for productive investment. Industrial development is yet to pick up in the State in a big way. The traditional industries like coir, cashew, and handloom have been facing innumerable problems and as they hold a large section of the industrial labour force, a significant share of the outlay for the industrial sector has to be earmarked for supporting them.

Thus as a result of a low rate of growth in both agriculture and industry, employment generation in the State has been low. The State today has the largest number of unemployed in the country compared to the population. The Employment Exchange figures reveal that there are about 25 lakhs of people openly seeking employment. Nearly half of these belong to the category of educated unemployed.

The overall growth rate of Kerala's economy is lagging behind that of the national economy to a significant extent. This has been so because of differences in the sectoral growth rates between the State's economy and the national economy, because of the growth of social services the State's expenditure on 'Social and Community Services' is over 50% of the total non-plan expenditure. under Plan expenditure also a significant share is appropriated by the social services sector in which the State has made considerable strides. The larger expenditure in this sector is mainly needed for the proper maintenance of these services.

The tasks ahead are no doubt formidable, particularly creation of employment opportunities of an adequately gainful nature. This calls for measures that would apart from raising productivity promote rapid industrialisation.

In the Seventh Plan for Kerala, Priority is given to programmes for employment generation, special programme for the poor, agricultural and industrial programmes. Priority is also be given to improvement in the quality of the social services and the increased use of physical infrastructure that has already been built. The scope and potential of sectors such as fisheries, forestry and animal husbandry have been gone into greater detail as these are employment generating sectors. The Planning Commission's guidelines regarding anti-poverty programmes have been taken note of in formulating the Draft Plan for the State. Special programmes such as the New Twenty Point Programme have also been emphasised in drawing up the plan.

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